FURUNO

INSTALLATION MANUAL

COLOR MULTI-SECTOR SONAR

MODEL CH-34/36

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FIRST EDITION : MAY 1992
J : JUL. 3, 1998

PUB. No. IME-12820-J
(TATA) CH-34/36

000803180000

⚠ SAFETY INSTRUCTIONS

"**DANGER**", "**WARNING**" and "**CAUTION**" notices appear throughout this manual. It is the responsibility of the installer of the equipment to read, understand and follow these notices. If you have any questions regarding these safety instructions, please contact a FURUNO agent or dealer.

⚠ **DANGER**	This notice indicates a potentially hazardous situation which, if not avoided, will result in death or serious injury.
⚠ **WARNING**	This notice indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠ **CAUTION**	This notice indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury, or property damage.

⚠ WARNING

Only qualified personnel should work inside the equipment.

This equipment uses high voltage electricity which can shock, burn, or cause death.

Turn off the power at the ship's mains switchboard before beginning the installation. Post a warning sign near the switchboard to ensure that the power will not be applied while the equipment is being installed.

Serious injury or death can result if the power is not turned off, or is applied while the equipment is being installed.

⚠ CAUTION

Ground the equipment.

Ungrounded equipment can give off or receive electromagnetic interference or cause electrical shock.

Confirm that the power supply voltage is compatible with the voltage rating of the equipment.

Connection to the wrong power supply can cause fire or equipment damage. The voltage rating appears on the label at the rear of the equipment.

⚠ CAUTION

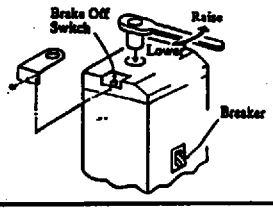
Keep oil away from eyes. Wear protective goggles when working with the oil. The oil cause inflammation of the eyes.
Do not touch the oil. The oil can cause inflammation of the skin. Wear protective gloves when working with the oil.
Do not ingest the oil. Diarrhea or vomiting can result.
Keep the oil out of reach of children.

EMERGENCY
If the oil enters the eyes, flush with clean water about 15 minutes. Consult a physician.
If oil contacts skin, wash with soap and water.
If the oil is ingested, see a physician immediately.

DISPOSAL OF OIL AND ITS CONTAINER
Dispose of oil and its container in accordance with local regulations. For further infomaton, contact place of purchase.

STORAGE
Seal container to keep out foreign material.
Store in dark place

Manual Raise/Lower of Transducer
Supply ship's mains to the hull unit and turn of the breaker on the hull unit. Then while pressing the brake-off switch, turn hand crank to raise or lower the transducer.



Observe maximum allowable ship's speed of 18 knots during operation and 15 knots while raising/lowering transducer.

The zinc block attached near the transducer must be replaced yearly.

The junction between the transducer and main shaft may corrode, which can result in loss of the tansducer or water leakage inside the ship.

Table of Contents

SPECIFICATIONS OF COLOR MULTI SECTOR SONAR CH-34/36

1. Display System

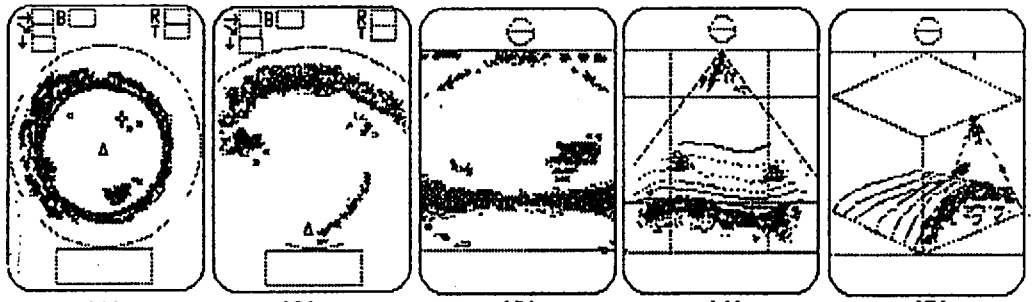
PPI display on high resolution 12" (CH-34) or 14" (CH-36) color CRT

2. Picture Color

16 or 8 colors depending on signal strength

3. Display Mode

(1) Normal sonar mode display*
(2) Expanded sonar mode display
(3) Vertical fan mode display *
(4) 3D mode display (front view)**
(5) 3D mode display (slant view)**



* : *E/S combination display is optionally available in modes (1) and (3).*
**: *Optionally available.*

4. Range/Train Speed

(1) Sonar Mode

	Detection Range				Train Speed* (sec./360°)
	Meter	Feet	Fathom	Remark	
1	0-50	0-200	0-40		3.8
2	0-100	0-300	0-60		4.3
3	0-150	0-400	0-80		4.8
4	0-200	0-600 0-500	0-100	60kHz 162kHz	5.4
5	0-250	0-800 0-600	0-120	60kHz 162kHz	6.4
6	0-300	0-1000 0-800	0-160 0-140	60kHz 162kHz	6.7
7	0-400 0-350	0-1500 0-1000	0-250 0-160	60kHz 62kHz	7.0
8	0-500 0-400	0-2000 0-1200	0-300 0-200	60kHz 162kHz	7.6
9	0-600 0-450	0-2500 0-1500	0-400 0-250	60kHz 162kHz	8.6

10	0-800 0-500	0-3000 0-2000	0-500 0-300	60kHz 162kHz	10.0
11	0-1200 0-600	0-4000 0-2500	0-700 0-400	60kHz 162kHz	12.0
12	0-1600 0-800	0-5000 0-3000	0-900 0-500	60kHz 162kHz	14.0

*: Measured at " Fast Train" mode.
Display sector width is selected among 45°, 90°, 135°, 180°, 225° and 360°.

(2) Vertical Fan Mode

	Vertical Detection Range**			Vertival Scanning Speed* (sec./180°)
	Meter	Feet	Fathom	
1	0-20	0-100	0-20	4.8
2	0-40	0-150	0-30	4.8
3	0-60	0-200	0-40	4.8
4	0-80	0-250	0-50	4.8
5	0-100	0-300	0-60	4.8
6	0-120	0-400	0-70	5.6
7	0-160	0-500	0-80	7.5
8	0-200	0-600	0-100	9.4
9	0-240	0-800	0-120	11
10	0-280	0-1000	0-160	13
11	0-320	0-1200	0-200	15
12	0-400	0-1500	0-250	19

*: Selected "Fast Scan" on the sub-panel 2.
**: Horizontal range is either equal to or 50% of the vertical range.
Display sector width is selected among 36°, 60°, 96°, 120°, 156° and 180°.

(3) Echo Sounder Range

Range	Display Range						
	Meter	Feet	Fathom	Unit Shift Range			Max. Shift Range
1	0-40	0-100	0-20	20M	50F	10FA	1000M 3000FT 500FA
2	0-80	0-200	0-40	20M	50F	10FA	
3	0-160	0-400	0-80	50M	100FT	20FA	
4	0-240	0-600	0-120	100M	200FT	50FA	
5	0-320	0-1000	0-160	100M	200FT	50FA	

5. Off Center

Four-position selected by TRAIN knob in expanded sonar mode.
Two-position selected by TILT knob in vertical fan mode.

6. Numeric Information and Display Scale/Mark

Training Data	Range, Tilt angle
Trackball Data	Slant, Horizontal range, depth, Bearing

R/B Mark Data Range, Bearing

Scale/Marker Bearing scale, Sector center mark, Own ship's mark, Trackball and Event markers

Latitude/longitude, courseline and north mark are displayed when nav sensor is connected.

7. Audio Monitor

Output 4W, 4Ω using external speaker CA-150 (option)

Frequency 900/1000Hz selected by internal settings

8. Transceiver

Frequency: 60 or 162kHz

Output Power and Beamwidth

(1) Sonar Mode

Freq.	Output* Power	Beamwidth at -3dB				
		TX			RX	
		Hor.		Vert.	Hor.	Vert.
60kHz	1.0kW	60° (FAST TRAIN "ON")	16°**	13°	16°	13°
162kHz	1.5kW		9°**	6°	8°	6°

*: Output power can be reduced in three steps.
**: Fast Train mode "OFF"

(2) Vertical Fan Mode

Freq.	Output* Power	Beamwidth at -3dB			
		TX		RX	
		Hor.**	Vert.	Hor.*	Vert.
60kHz	1.0kW	16°	13°	16°	13°
162kHz	1.5kW	9°	6°	8°	6°

*: Output power can be reduced in three steps.
**: 30° approx. when selecting "WIDE" beamwidth on the menu.

Pulselength: 0.2 to 10.6ms, fixed or varied according to the range in use (selectable on the Menu)

9. Training

Mode	Sonar (horizontal) mode	Vertical Fan mode
Train Step	45° or 6° step	Auto Train: 15° step Manual: 6° step
Auto Train Sector	–	90°, 180° or 360°
Manual Train Sector	–	Half (174°) or Full (360°)

10. Tilting

Mode	Sonar (horizontal) mode	Vertical Fan mode
Tilt Range	+5° to 90°	0° to +180°
Tilt Step	1°/step	6° or 3°/step
Stabilizer (option)	Motion sensor MS-100 stabilizes sounding beam against rolling and pitching of up to ±20°.	

11. Transducer Raise/Lower

Transducer travel: 400mm
Raise time: approximately 10 sec (24/32Vdc)
Lower time: approximately 8 sec (24/32Vdc)

12. Allowable Ship's Speed

18 knots (15 knots during raise/lower operation)

13. Power Supply and Consumption

24/32VDC, 200W (300W during transducer raise/lower)
100/110/200/220VAC, 50/60Hz with two sets of rectifiers RU-1746B-2

14. Ambient Condition

Temperature: 0°C to 50°C
Humidity: less than 95%

COMPLETE SET

STANDARD SUPPLY

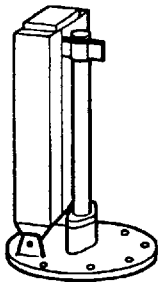
No.	Name	Type	Code No.	Qty	Weight (kg)	Remarks
1	Display Unit	CH-340-E CH-360-E	000-068-410 000-068-412	1	16 20	12" CRT 14" CRT
2	Transceiver Unit	CH-341-60 CH-341-162	000-068-414 000-068-417	1	8.5	60kHz 162kHz
3	Hull Unit	CH-342		1	55	Specify the power supply voltage, frequency and main shaft length when ordering.
4	Accessories	FP02-03200	000-014-745	1		
5	Installation Materials	CP06-00800 CP06-00810 CP06-00820	000-068-443 000-068-444 000-068-445	1		With 15m cable (STD) With 30m cable With 50m cable
6	Spare Parts	SP06-00800	000-068-442	1		

OPTION

No.	Name	Type	Code No.	Weight (kg)	Remarks
1	Motion Sensor	MS-100	000-069-256	2	
2	Remote Control	CH-343-E	000-068-449	0.4	
3	Rectifier	RU-1746B-2	000-030-439 000-030-440	17	For 110VAC For 220VAC
4	Retraction Tank	06-007-1570(steel) SHJ-0001(steel) 06-007-1571(steel) SHJ-0022(FRP) 06-007-1573(FRP)	600-715-700 661-000-010 600-715-710 661-000-220 600-715-730		For 1.1m shaft For 2.2m shaft For 3.5m shaft For 1.1m shaft For 2.2m shaft
5	Interface	CH-344	000-068-447		For connection of external equipment.
6	E/S Interface	VI-1100A	000-021-803	2	
7	External Speaker	CA-150	000-109-070		
8	Handle	OP03-70	008-423-420		For CH-36 only

HULL UNIT ASSEMBLY COMBINATION

R/L DRIVE UNIT



Power	Freq.	Type	Code No.
DC24V	60kHz	CH-3421-60-2	006-547-010
	162kHz	CH-3421-162-2	006-547-070
DC32V	60kHz	CH-3421-60-3	006-547-020
	162kHz	CH-3421-162-3	006-547-080

SHAFT

STANDARD

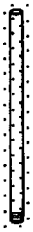
1.17m

Type	Code No.
06-008-1021	100-028-500

OPTION

2.2m

Type	Code No.
SHJ-0006-1	661-000-061

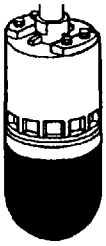


3.8m

Type	Code No.
06-007-1572	600-715-720

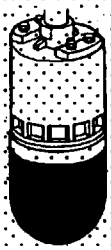
SOUNDOME

2.7m Cable



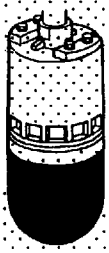
Power	Freq.	Type	Code No.
DC24V	60	CH-3422-60-11	006-547-090
DC32V	162	CH-3422-162-11	006-547-180

3.7m Cable



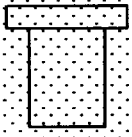
Power	Freq.	Type	Code No.
DC24V	60	CH-3422-60-22	006-547-100
DC32V	162	CH-3422-162-22	006-547-190

5.7m Cable



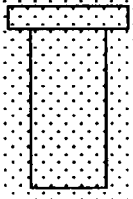
Power	Freq.	Type	Code No.
DC24V	60	CH-3422-60-38	006-547-110
DC32V	162	CH-3422-162-38	006-547-200

TANK



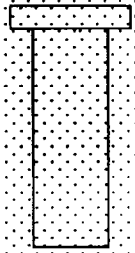
1m

	Type	Code No.
IRON	06-007-1570	600-715-700
FRP	SHJ-0022	661-000-220
ALUM	10-044-2601	100-127-500



1.8m

	Type	Code No.
IRON	SHJ-0001-0	661-000-010
FRP	06-007-1673	600-715-730



3.5m

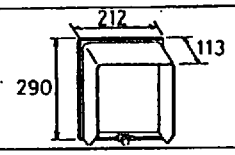
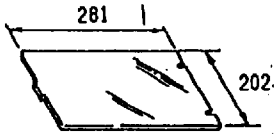
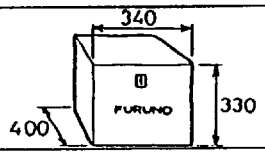
	Type	Code No.
IRON	06-007-1571	600-715-710

FURUNO

CODE NO.	000-014-745	06AP-X-9501
TYPE	FP02-03200	

付属品表 ACCESSORIES

CH-34 カラーセクタースキャニングソナー COLOR SECTOR SCANNING SONAR

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	フードASSY. HOOD ASSY.		FP03-02910 CODE NO. 008-223-520	1	
2	12インチフィルター 12" FILTER		02-083-1601-2 CODE NO. 100-103-562	1	
3	ビニールカバー PLASTIC COVER		02-102-1301-1 CODE NO. 000-802-442	1	
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図番 DWG. NO. C1282-F01-A

検図 CHECKED

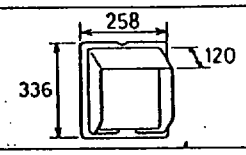
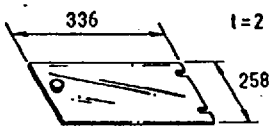
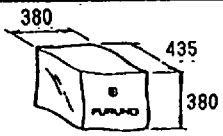
FURUNO ELECTRIC CO., LTD

FURUNO

CODE NO.	000-014-562	06AP-X-9502
TYPE	FP02-02600	

付属品表 ACCESSORIES

CH-36 カラーセクタースキャニングソナー COLOR SECTOR SCANNING SONAR

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	フード HOOD		10-044-0032-1 CODE NO. 100-109-251	1	
2	フィルター組品 FILTER ASSY.		FP02-02620 CODE NO. 002-007-290	1	
3	ビニールカバー PLASTIC COVER		10-044-0031-1 CODE NO. 000-801-859	1	
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図番 DWG. NO. C1283-F01-A

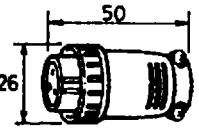
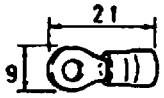
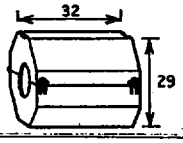
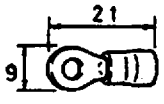
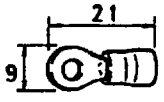
検図 CHECKED

FURUNO ELECTRIC CO., LTD

FURUNO

CODE NO.	006-547-240	06AP-X-9401-3
TYPE	CP06-00830	

工事材料表 INSTALLATION MATERIALS	CH-34/36	カラーセクタースキャニングソナー COLOR SECTOR SCANNING SONAR

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	コネクタ CONNECTOR		NJC-203-PF CODE NO. 000-506-703	1	指示器用 FOR DISPLAY UNIT
2	圧着端子 CRIMP-ON LUG		FV2-4 アオ BLUE CODE NO. 000-538-118	4	指示器用 FOR DISPLAY UNIT
3	アース銅板 COPPER STRAP		WEA-1004-0 CODE NO. 500-310-040	1	指示器用 FOR DISPLAY UNIT
4	EMIコア EMI CORE		ESD-SR-25 CODE NO. 000-123-303	1	指示器用 FOR DISPLAY UNIT
5	圧着端子 CRIMP-ON LUG		FV2-4 アオ BLUE CODE NO. 000-538-118	2	送受信装置用 FOR TRANSCEIVER UNIT
6	アース銅板 COPPER STRAP		WEA-1004-0 CODE NO. 500-310-040	1	送受信装置用 FOR TRANSCEIVER UNIT
7	圧着端子 CRIMP-ON LUG		FV2-4 アオ BLUE CODE NO. 000-538-118	6	上下装置用 FOR HULL UNIT
			CODE NO.		
			CODE NO.		
			CODE NO.		

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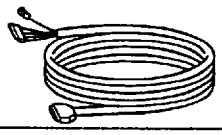
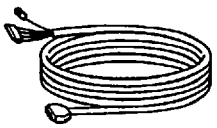
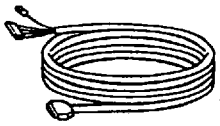
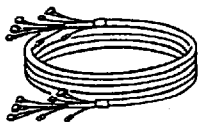
図番 DWG. NO. C1282-M01-D

FURUNO ELECTRIC CO., LTD

FURUNO

CODE NO.		06AP-X-9402-1
TYPE		

工事材料表 INSTALLATION MATERIALS	CH-34/36	カラーセクタースキャニングソナー COLOR SECTOR SCANNING SONAR

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	ケーブル組品 CABLE ASSY.	 L=15m	06S4050-1 *15M* (IFVV-SB25P XAWG28) CODE NO. 000-120-931	1	
1	ケーブル組品 CABLE ASSY.	 L=30m	06S4050-1 *30M* (IFVV-SB25P XAWG28) CODE NO. 000-120-932	1	
1	ケーブル組品 CABLE ASSY.	 L=50m	06S4050-1 *50M* (IFVV-SB25P XAWG28) CODE NO. 000-120-933	1	
2	ケーブル組品 CABLE ASSY.	 L=5m	06S4061-1 *5M* (06S4056) CODE NO. 000-126-159	1	
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		
			CODE NO.		

番号1はいずれか選択.
SELECT ONE FOR NO.1 CABLES.

図番 DWG. NO. C1282-M02-B (1/1)

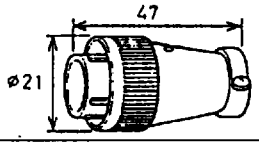
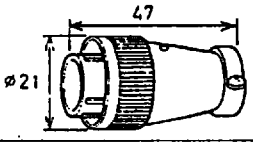
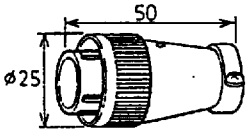
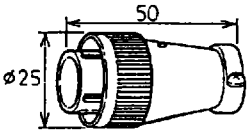
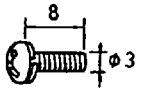
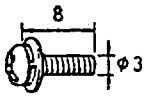
検図 CHECKED

FURUNO ELECTRIC CO., LTD

FURUNO

CODE NO.	006-550-150	06AP-X-9403
TYPE	CP10-00840	

工事材料表 INSTALLATION MATERIALS	CH-344	外部インターフェース INTERFACE MODULE	

番号 No.	名称 NAME	略図 OUTLINE	型名／規格 DESCRIPTIONS	数量 Q'TY	用途／備考 REMARKS
1	コネクタ CONNECTOR		SRCN6A13-3P CODE NO. 000-508-660	1	
2	コネクタ CONNECTOR		SRCN6A13-5P CODE NO. 000-508-661	1	
3	コネクタ CONNECTOR		SRCN6A16-7P CODE NO. 000-508-662	1	
4	コネクタ CONNECTOR		SRCN6A16-10P CODE NO. 000-508-663	2	
5	イラックスチューブ INSULATION TUBE		φ3 *50CM* 黄 YEL CODE NO. 000-568-226	2	
6	ナベセムスネジA WASHERHEAD SCREW A		M3X8 C2700W MBNI2 CODE NO. 000-881-104	6	
7	ナベセムスネジB WASHERHEAD SCREW B		M3X8 C2700W MBNI2 CODE NO. 000-881-404	4	
			CODE NO.		
			CODE NO.		
			CODE NO.		

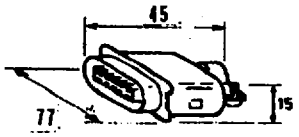
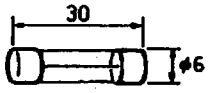
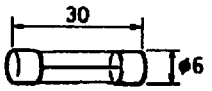
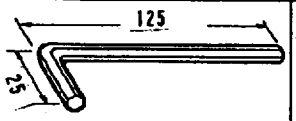
図番 DWG. NO.	(1/1) C1282-M03-B

FURUNO ELECTRIC CO., LTD

FURUNO

CODE NO.	000-068-442	06AP-X-9301-3
TYPE	SP06-00800	BOX NO. P

SHIP NO.	SPARE PARTS LIST FOR	U S E	SETS PER VESSEL
	CH-34/36 カラーセクタースキャニングソナー COLOR SECTOR SCANNING SONAR		

ITEM NO.	NAME OF PART	OUTLINE	DWG. NO. OR TYPE NO.	QUANTITY WORKING PER SET	QUANTITY WORKING PER VES.	QUANTITY SPARE	REMARKS/CODE NO.
1	コネクタ CONNECTOR		57-30500	1		1	000-504-000
2	管入りヒューズ GLASS TUBE FUSE		FGBO-A 4A AC125V	1		5	000-127-233
3	管入りヒューズ GLASS TUBE FUSE		FGBO 7A AC125V	2		10	000-549-013
4	ボールレンチ HEX.WRENCH		TWB-30		1		000-803-168

MFR'S NAME	FURUNO ELECTRIC CO., LTD	DWG. NO.	C1282-P02-A	1/1

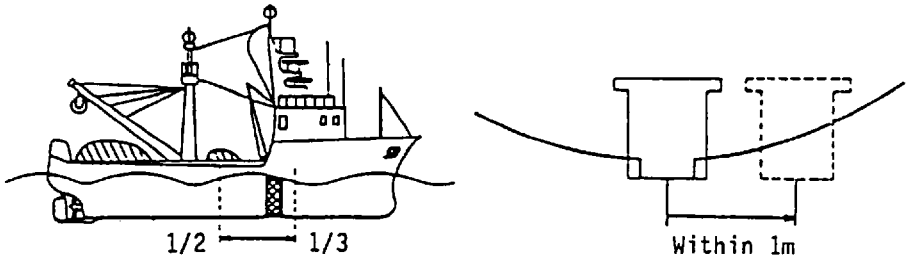
CHAPTER 1. MOUNTING

1.1 Hull Unit

1.1.1 Installation Position of Hull Unit

Discussion and agreement are required with the dockyard and the ship owner in deciding the installation position of the hull unit. When deciding the installation position, the following points should be taken into account.

1) Select an area where propeller noise, cruising noise, bubbles and interference from turbulence are at a minimum. Generally the position at 1/3 to 1/2 of the ship's length from the bow on or near the keel is optimum. On-the-keel installation is advantageous for minimizing oil consumption in comparison with the off-the-keel. In case the hull unit can not be installed on the keel, the center of the retraction tank should be within 1m of the keel so as to minimize the rolling effect.



Installation Position of Hull Unit

2) Select a place where interference from other equipment is minimal. It should be at least 2.5m away from the transducers of other equipment.

3) An obstacle in the fore direction not only causes shadow zone but also aerated water, resulting in poor sonar performance.

1.1.2 Mounting Retraction Tank

NOTE: When retraction tank is produced in the field, the inner diameter should be φ190±0.5mm. If it is bigger, the shaft may be damaged by vibration.

Mounting Method

A typical mounting method is shown on page 1-3. Consult the ship's owner, dockyard and user to determine the mounting method. Pay attention to safety (strength, watertightness, etc.) for the first thing and then to the ease of maintenance and inspection.

Deciding Tank Length

Cut off excess portion of the tank so that the transducer is lowered into water as deep as possible.

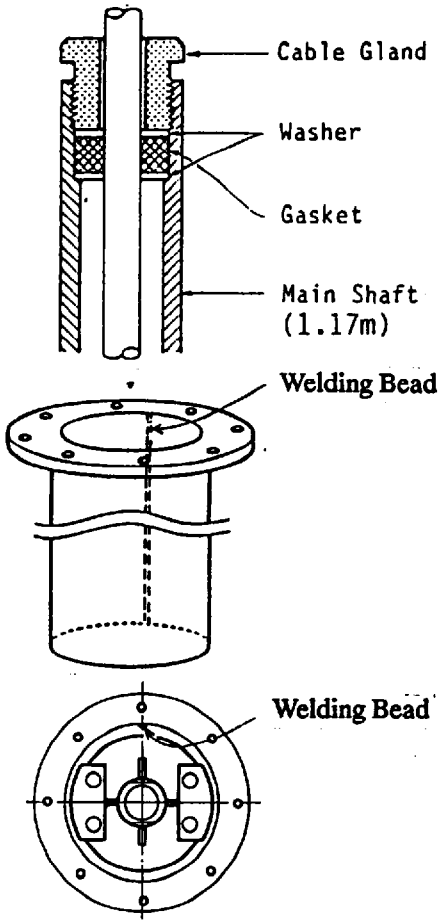
In addition, take note of the tank length Lt . It is necessary to determine the length of the main shaft as described in the next paragraph "Assembling and Mounting of Hull Unit".

Main Shaft Length = Lt + 110 (mm)

Note 1. *Do not cut off the 1m retraction tank. If some portion is cut off, you may also have to cut off the top part of the main shaft, destroying the watertight construction of the 1.17m shaft.*

2. *When the retraction tank is made locally, finish it so that the welding bead may not protrude on the inner surface of tank. The tank guide will hit the bead, causing the motor burn-out. Also when installing the tank, do not position the welding bead in the ship's fore-aft-line.*

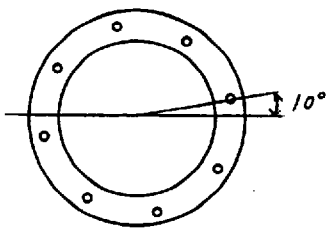
3. *When you want to use other maker's tank, check the dimensions strictly. Use the same dinession's tank by referring to page 1-19.*

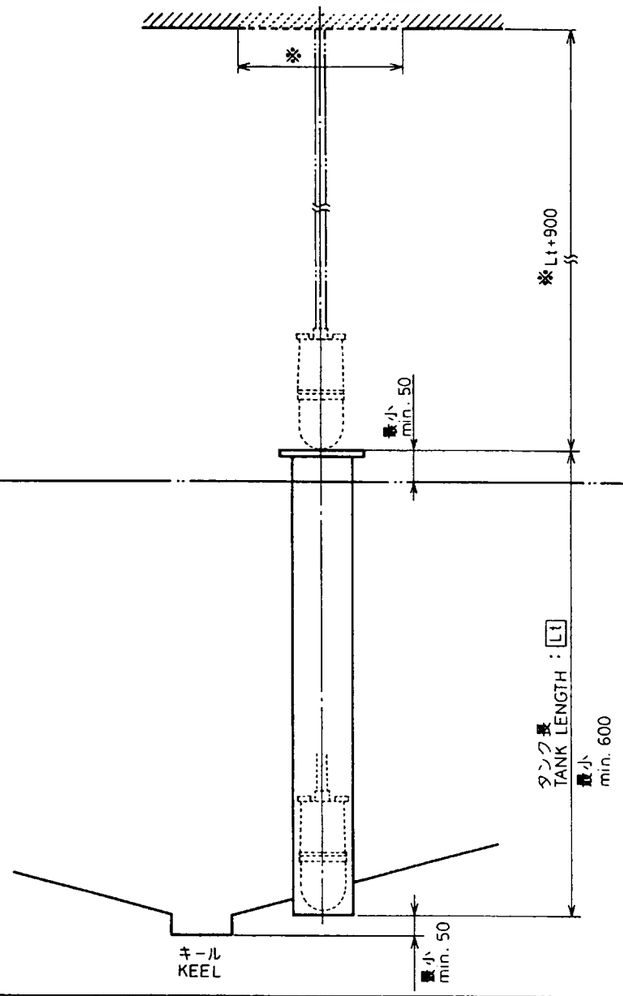
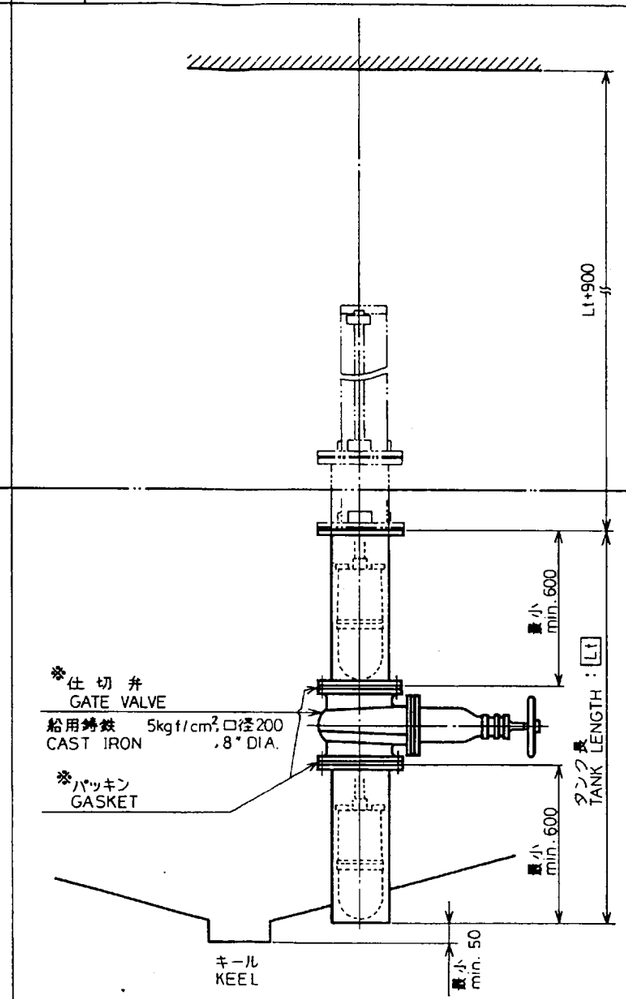
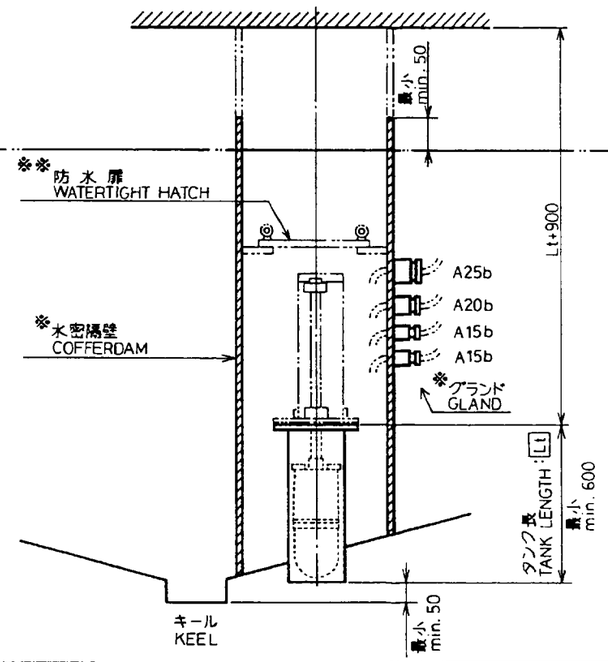


Mounting

Install the tank referring to the drawings on page 1-19 to 1-26.

Note: Locate one of the bolt holes by 10° to port to minimize mechanical shock applied to the raise/lower block due to ship's rolling and pitching.



条件 CONDITION	A	B	C
	タンク長を満載時の吃水線の上までとれる場合。 WHEN THE LONGER TANK IS USED SO THAT IT FLANGE POSITIONS ABOVE WATER LINE.	1. オフシーズンに上下装置を取り外しておく場合。 THIS METHOD ALLOWS TO EASILY REMOVE THE SOUNDOME DURING A PERIOD OF NON-OPERATION OR SERVICING. 2. タンク長を吃水線の上までとれない場合。 WHEN THE LONGER TANK IS NOT USED DUE TO LIMITED CLEARANCE.	タンク長を吃水線までとれない場合で、仕切り弁を使用しない時。 WHEN THE LONGER TANK OR A GATE VALVE CAN NOT BE USED.
装備法 METHOD			
注 NOTE	1. この装備法を標準として推奨する。 THIS METHOD IS RECOMMENDED AS STANDARD INSTALLATION. 2. ※ : 上下装置の上部に "LTt+930" のサービス空間が取れない場合は、天井に "300×300" の穴を明けておくこと。 ※ : IF OVERHEAD CLEARANCE "Lt+930" IS NOT ALLOWED, MAKE A HOLE OF 300×300mm ON CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.	1. 条件 (1). の目的でこの装備法を行なう場合には左図 (A) と同様に吃水線の上までタンク長をとる方が望ましい。 LIKE THE INSTALLATION METHOD A, THE TANK FLANGE POSITION IS DESIRED TO BE ABOVE WATER LINE.	1. 水密隔壁は船級協会規則を参照し造船所で作成下さい。その際サービススペースも考慮して下さい。 FABRICATE THE COFFERDAM BY SHIPYARD IN ACCORDANCE WITH CONCERNED REGULATIONS. ALSO ALLOW ENOUGH MAINTENANCE SPACE. 2. ※※ : 水密隔壁の上限を吃水線の上までとれない場合にも、上下装置取り外しのための防水扉を設けること。 ※※ : PROVIDE A WATERTIGHT HATCH FOR FUTURE MAINTENANCE IF A COFFERDAM IS NOT HIGH ABOVE WATER LEVEL.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

注 NOTE
1. 装備法の決定に際しては安全性（強度, 水密性）を重視し、それに併せて保守・点検の容易さも考慮のこと。
DECIDE AN INSTALLATION METHOD CONSIDERING SUFFICIENT REINFORCEMET AND WATERTIGHTNESS OF THE SHIP'S HULL. ALSO PROVIDE ENOUGH MAINTENANCE SPACE.
2. ※, ※※, ; 造船所手配
SHIPYARD SUPPLY.
3. 単位 UNIT : mm

CH－34／36

承認 APPROVED	・ ・	三角法 THIRD ANGLE		名称 TITLE	格納タンクの装備例 RETRACTION TANK INSTALLATION METHOD
検図 CHECKED	・ ・	尺度 SCALE	／		
製図 DRAWN	・ ・	重量 WEIGHT	kg	図番 DWG.NO	C1282-Y01-A

FURUNO ELECTRIC CO., LTD.

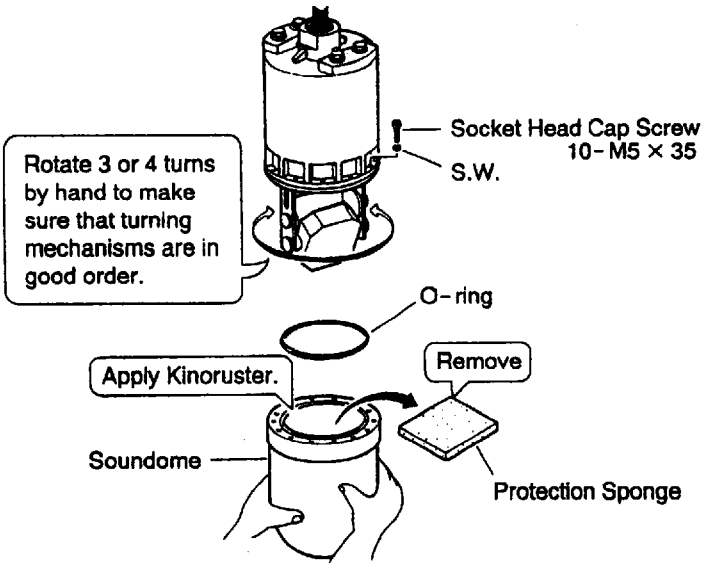
1.1.3 Assembling and Installation of Hull Unit

You will receive the hull unit disassembled to parts shown on page 1-10. To assemble them, follow the procedure shown below.

Necessary Tools

Name	Specification	Remarks
Spanner	For M10 (Hex. size 17mm)	
Spanner	For M20 (Hex. size 20mm)	
Pipe Wrench	55mm	
Ball Wrench		supplied as a hull unit kit

1 Unscrew 12 pcs of socket head cap screws with the ball wrench supplied and detach the soundome.



⚠ CAUTION

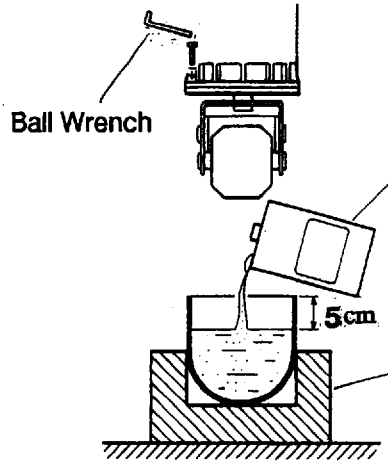
Keep oil away from eyes. Wear protective goggles when working with the oil. The oil cause inflammation of the eyes.
Do not touch the oil. The oil can cause inflammation of the skin. Wear protective gloves when working with the oil.
Do not ingest the oil. Diarrhea or vomiting can result.
Keep the oil out of reach of children.

EMERGENCY
If the oil enters the eyes, flush with clean water about 15 minutes. Consult a physician.
If oil contacts skin, wash with soap and water.
If the oil is ingested, see a physician immediately.

DISPOSAL OF OIL AND ITS CONTAINER
Dispose of oil and its container in accordance with local regulations. For further information, contact place of purchase.

STORAGE
Seal container to keep out foreign material.
Store in dark place

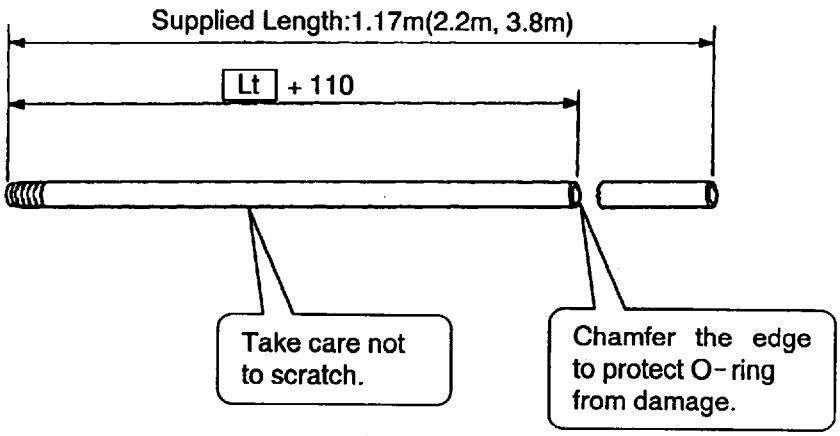
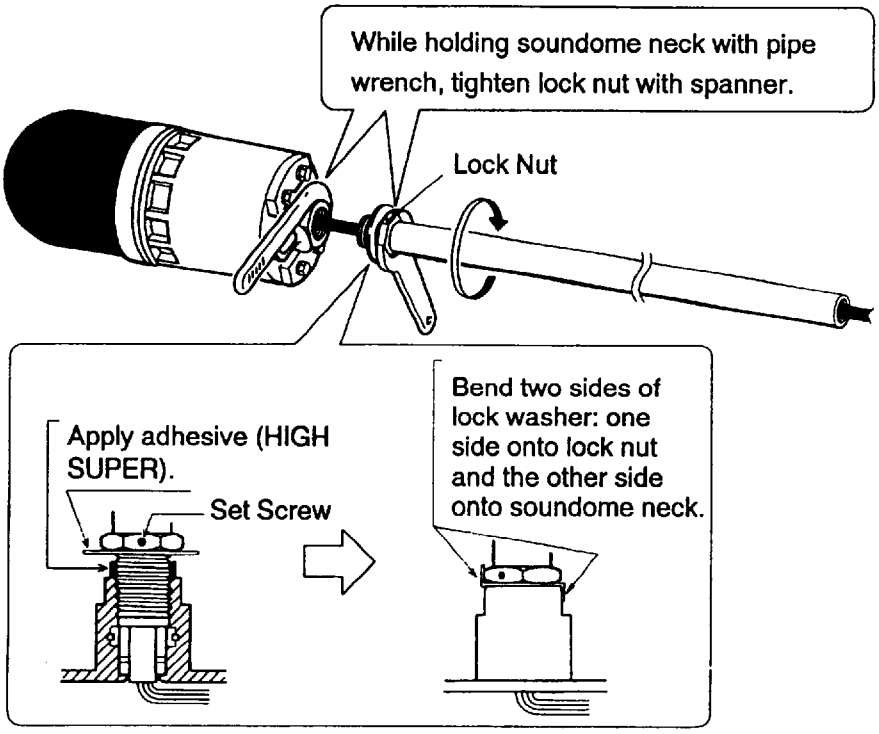
2 Fill the soundome with sonar oil up to 6 cm below the top of the dome. Then refit the soundome.

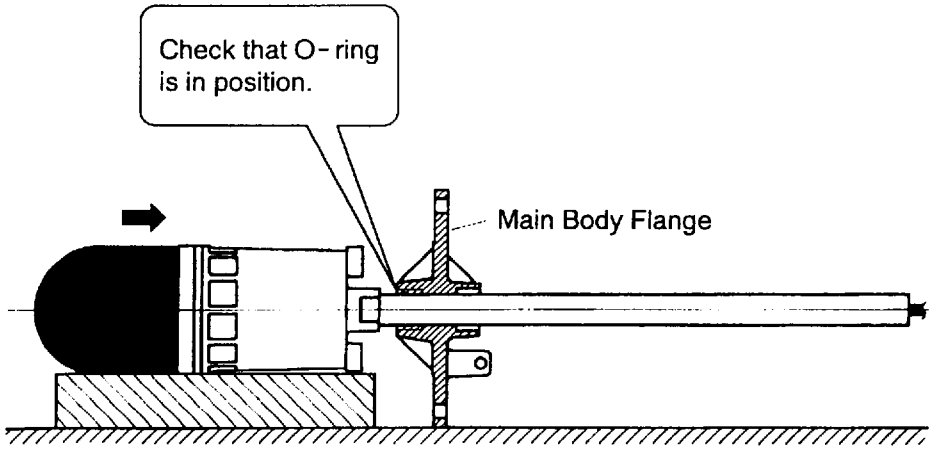
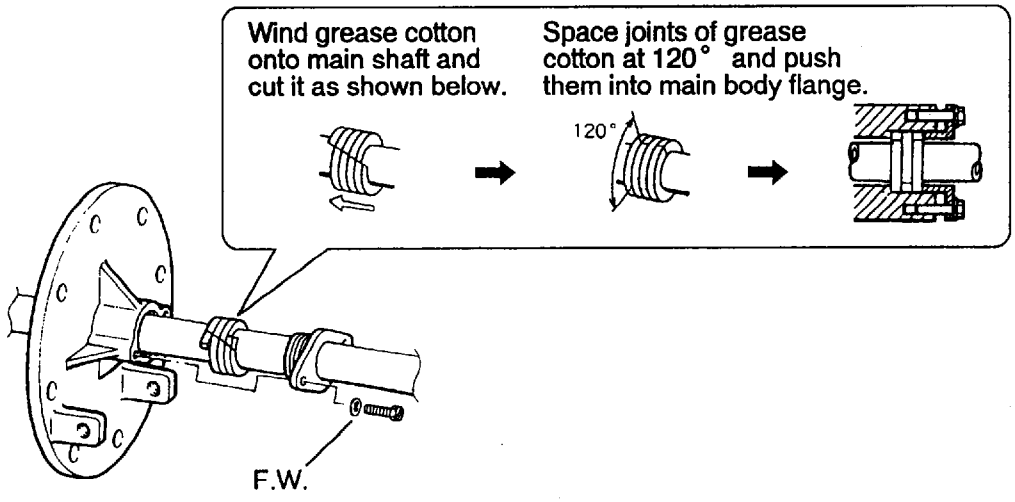
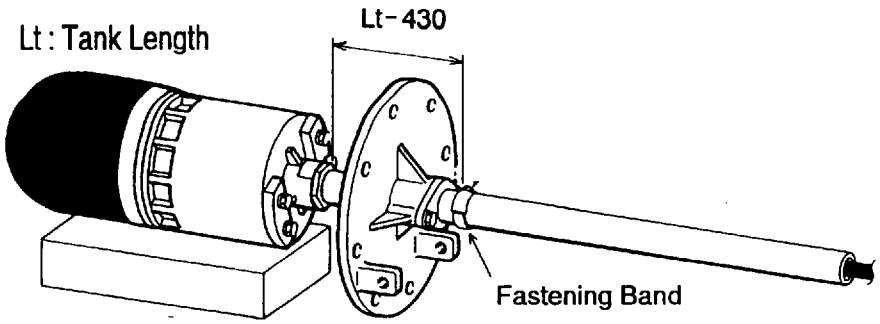


	Frequency(KHz)			
	60	81	115	162
Sonar Oil 4L (000-824-033)	×	○	○	○
Super Sonar Oil 4L (000-804-568)	○	×	×	×

○ : Can be used.
× : Can not be used.

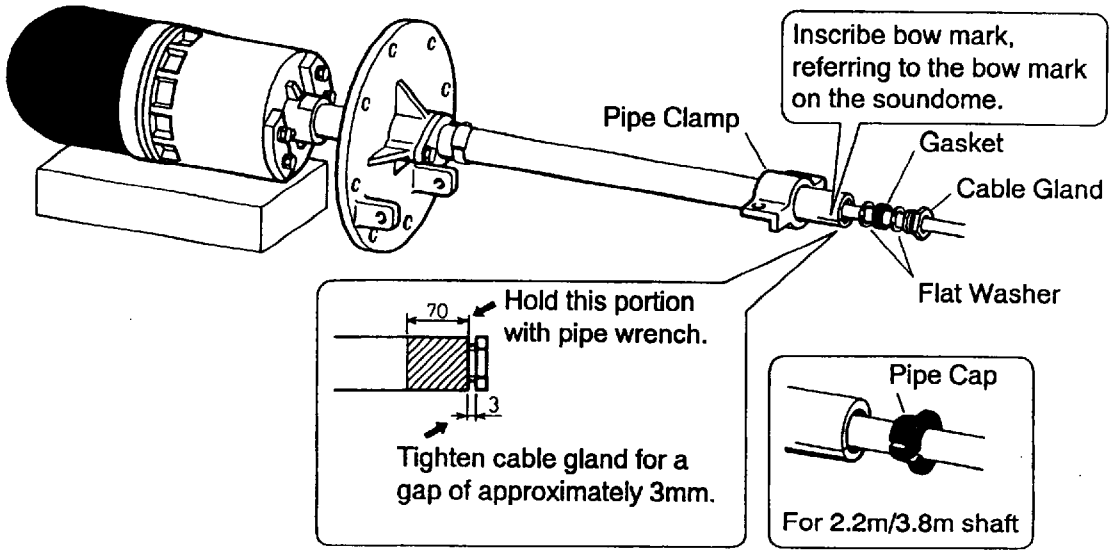
Note: Use the specified super sonar oil. Otherwise the expected performance can not be obtained.

	Cut the main shaft to the length of Lt +110, where Lt is the length of the retraction tank.
3	 Note: When the tank length is 1m, do not cut the 1.17m main shaft.
4	Fix the main shaft to the soundome assembly as follows. 1. Screw lock nut onto main shaft 2. After fully screwing main shaft into soundome neck, unscrew it by four turns and apply adhesive (HIGH SUPER) to the threads. 3. Screw in main shaft completely and tighten lock nut with spanner. 4. Tighten socket-set screw on lock nut. 5. Bend two sides of lock washer by using hammer; one side upward onto lock nut and the opposite side downward onto soundome neck.
	 Note: Do not hammer lock washer in such a direction that the lock nut is unscrewed.

5	Clean the main shaft and pass it through the main body flange. 
6	Install grease cotton to the main body flange and tighten the grease cotton retainer temporarily. 
7	Temporarily fasten the fastening band onto the main shaft at the position shown below. 

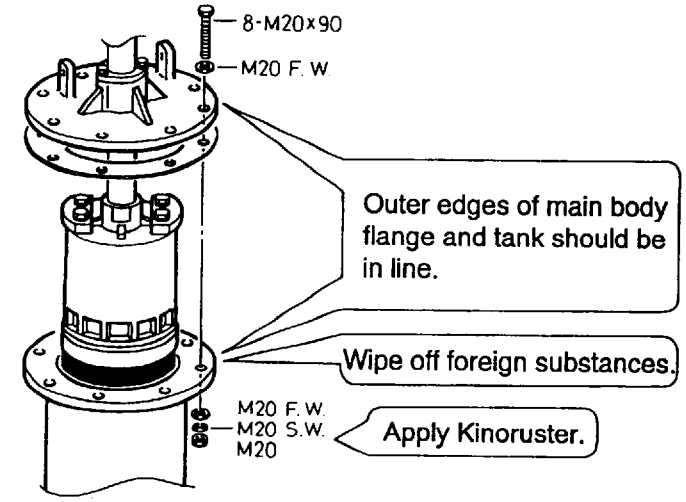
8

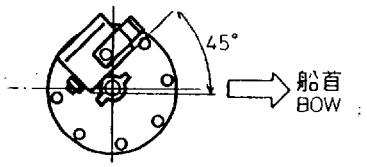
After inscribing bow mark on top of the main shaft, pass pipe clamp through the main shaft and install washer/gasket/cable gland.



9

Install the hull unit onto the transducer tank. It should be oriented so that the ship's fore-aft line crosses the front panel of the raise/lower drive block at an angle of approximately 45 degrees.

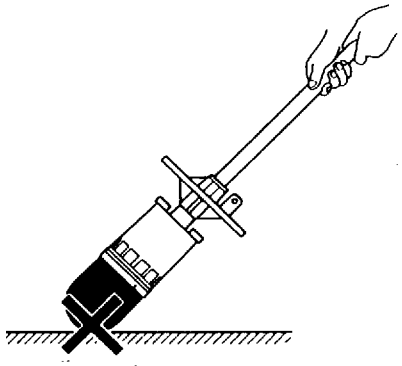


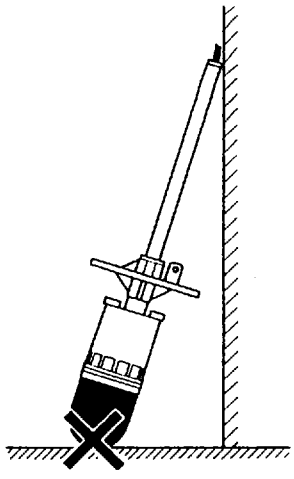


Shock and vibration applied to raise/lower drive block due to ship's rolling and pitching are minimum when the unit is oriented as shown above.

CAUTION

1. Do not drag the hull unit on the floor.
2. Do not rest the hull unit against wall.



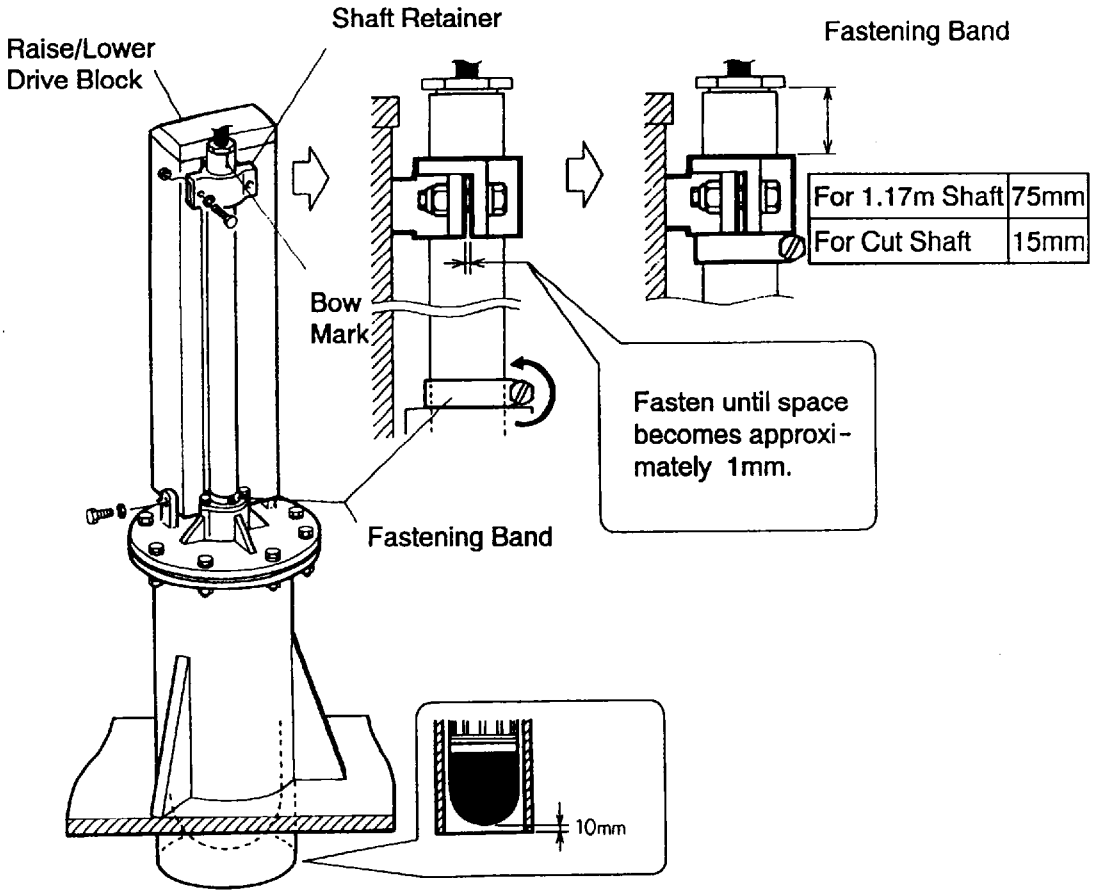


10

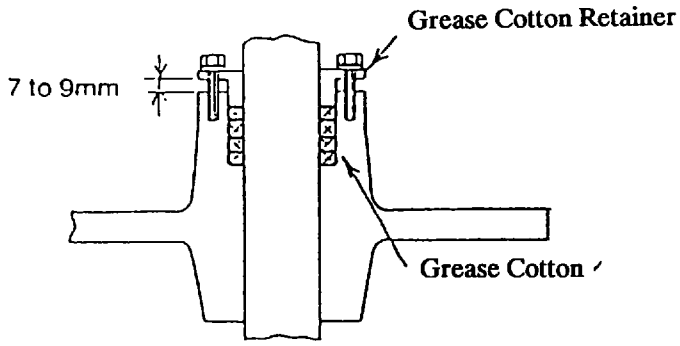
Install the raise/lower drive block in the following order.
1. Rotate the main shaft so that bow mark faces ship's bow.
2. Install the raise/lower drive block onto the main body flange.
3. Fix the main shaft with the shaft retainer.
4. Loosen the fastening band and slide it up to the shaft retainer and fasten it.
5. Check that the distance from the top of the main shaft to the top of the shaft retainer is as follows.

1.17m main shaft ---------- 75mm
Main shaft cut at Lt + 110 ------15mm

If not as shown above, loosen shaft retainer and fastening band to adjust the distance. This will place the bottom of soundome 10mm above the bottom of the retraction tank when the soundome is retracted.



11	Tighten the grease cotton retainer for a gap of 7 to 9mm.



HULL UNIT KIT

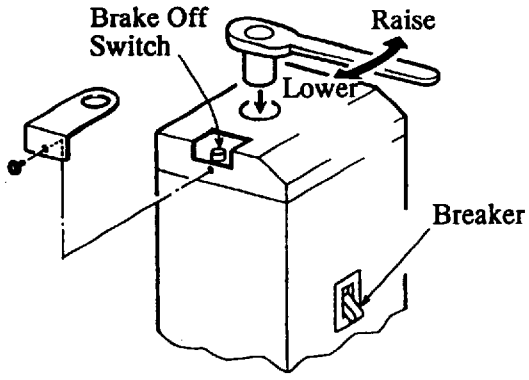
番号 No.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	上下動部 RAISE/LOWER DRIVE ASSEMBLY		CODE NO.		
2	旋回部 SOUNDOME ASSEMBLY		CODE NO.		
3	フランジ MAIN BODY FLANGE		06－018－3202 CODE NO. 100－162－031	1	
4	グリスコットン GREASE COTTON	500	□9.5＊0.6M＊ CODE NO. 000－859－013	(1)	
5	グリスコットン押え台 GREASE COTTON RETAINER	105 18	SHJ－0003－1 CODE NO. 661－000－031	(1)	
6	トラニオンボルト TRUNNION BOLT	35 φ12	06－013－3203－2 CODE NO. 100－143－912	(2)	
7	フランジパッキン GASKET	φ350	SHJ－0009－1 CODE NO. 661－000－091	(1)	
8	Oリング O RING	φ48 φ3	JISB2401－1A－P42 CODE NO. 000－851－142	(1)	
9	スリ割付六角ボルト SLOTTED HEX. BOLT	25 φ8	M8×25 SUS304 CODE NO. 000－801－701	(2)	
10	バネ座金 SPRING WASHER	28	M16 CODE NO. 000－864－265	(2)	
12	上下シャフト MAIN SHAFT	1170 φ42	06－008－1021－0 CODE NO. 100－028－500	1	
		2200 φ42	SHJ－0006－1 CODE NO. 661－000－061		
		3800 φ42	06－007－1572 CODE NO. 600－715－720		
13	ジュビリークリップ FASTENING BAND		1X SUS304 CODE NO. 000－801－857	1	
14	止めナット LOCK NUT	57 12	06－013－2401－0 CODE NO. 100－098－730	1	
15	六角穴付止めネジ SOCKET SET SCREW	5 φ4	M4×5 SUS CODE NO. 000－801－527	1	

番号 No.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
16	回り止め座金 STOPPER WASHER	φ70 t=0.8	06－013－2402－0 CODE NO. 100－098－740	1	
17	パイプキャップ PIPE CAP	φ44 35	06－007－1307－0 CODE NO. 600－713－070	1	
18	締め付けグランド CABLE GLAND		06－008－1031－0 CODE NO. 100－028－520	1	
19	座金 WASHER	37.4	06－018.－3302－0 CODE NO. 100－162－051	2	
20	ガスケット GASKET	37 10 t=	06－018－3303－1 CODE NO. 100－162－061	1	
21	六角ボルト HEX. BOLT	40 φ10	M10×40 CODE NO. 000－862－184	2	
22	バネ座金 SPRING WASHER	φ18	M10 SUS304 CODE NO. 000－864－261	2	
23	Uナット U－NUT	19 7	M10 SUS304 CODE NO. 000－863－930	2	
24	六角ボルト HEX. BOLT	80 φ20	M20×80 CODE NO. 000－801－893	8	
25	ミガキ平座金 FLAT WASHER	φ40	M20 SUS304 CODE NO. 000－864－136	16	
26	バネ座金 SPRING WASHER	φ34	M20 SUS304 CODE NO. 000－864－270	8	
27	六角ナット NEX. NUT	35 16	M20 SUS304 CODE NO. 000－863－116	16	
28	金属すきま腐触防止剤 ANTI－CREVICE CORROSION SEALANT	φ54 35 KINORUSTER	KINORUSTER 855 CODE NO. 000－801－025	1	
29	セメダイン ADHESIVE	80 15 32 セメダイン	ハイスーパー HIGH SUPER CODE NO. 000－856－520	1	
30	ソナーオイル SONAR OIL	103 178 238	4ℓ CODE NO. 000－824－033	1	60KHz Super Sonar Oil 4L (000-804-568)
31	ボールレンチ BALL WRENCH	135 28	HEX. SIZE 4mm CODE NO. 000－804－123	1	
			CODE NO.		

1.1.4 Manual Raise/Lower of Transducer with Hand Crank

This check should be performed after all cable wirings are completed: ship's mains should be supplied to the hull unit. Otherwise the magnetic brake of the raise/lower motor operates, disabling the manual raise/lower.

1. Turn off the breaker on the hull unit.
2. Remove the brake-off switch cover.
3. Set 19mm socket wrench and turn it while pressing the brake-off switch.
4. Check that the transducer can be raised/lowered smoothly with a constant force from the upper to the lower limit positions. If not, centers of the main body flange and the retraction tank are not aligned. Adjust the hull unit mounting position.



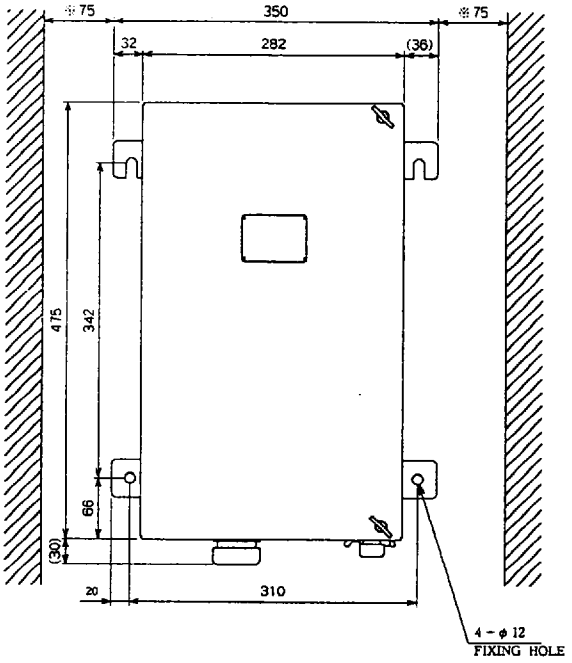
Raising/lowering manually without connecting ship's mains may cause motor damage.

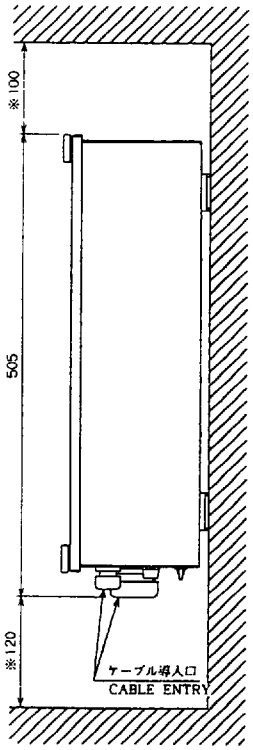
1.2 Transceiver Unit

1) Since the transceiver unit generates heat, install it on a dry well ventilated location.

2) Floor or bulkhead mounting is allowed.

3) Allow service and maintenance space.





1.3 Display Unit

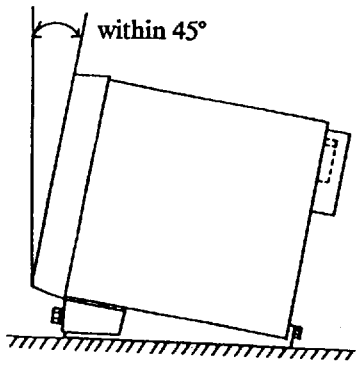
To install the display unit, the following conditions should be considered.

1) Place where operating personnel are able to control the unit easily while observing the fishing ground or area surrounding the vessel.

2) Place at least 1m away from magnetic components (radar magnetron, loudspeaker, high power transformer, etc.) and magnetic compass.

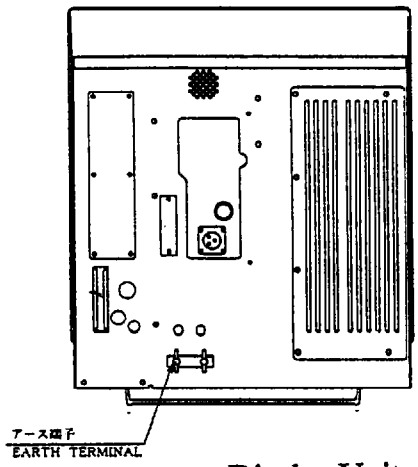
3) Place where the unit is not exposed to direct sunlight, water splash or hot air.

4) Place where the CRT face is within 45 from the vertical.

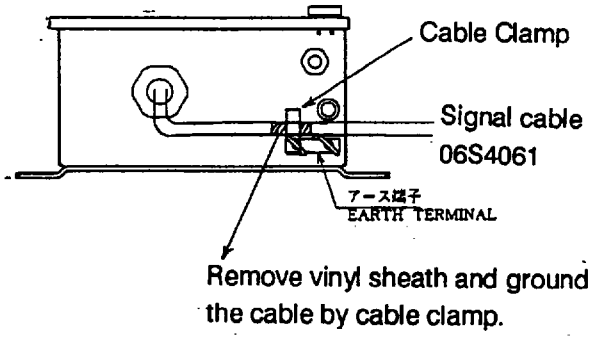


1.4 Unit Grounding

Since all units are very sensitive to noise, they should be grounded to ship's hull with specified copper strap or grounding wire. And also ground the signal cable 06S4061 by cable clamp.



Display Unit



Transceiver Unit

1.5 Motion Sensor MS-100 (Option)

The MS-100 measures ship's rolling and pitching angles with sensors using the principles of the gyroscope. Following in the footsteps of its predecessor model BS-704, the MS-100 is free from error caused by ship's vertical and horizontal motion and can be installed at any convenient location.However ship's semipermanent inclination due to loading imbalance, etc. can not be detected and should be compensated at installation as described in chapter 3.

1.5.1 Installation Site

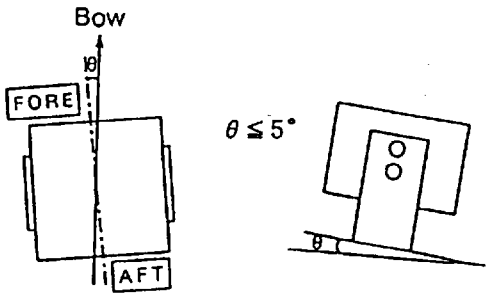
Basically, the unit can be installed at any location, provided that the following places are avoided. Especially pay attention to vibration which may be the main cause of erroneous reading. The recommended place is on the floor in the bridge.

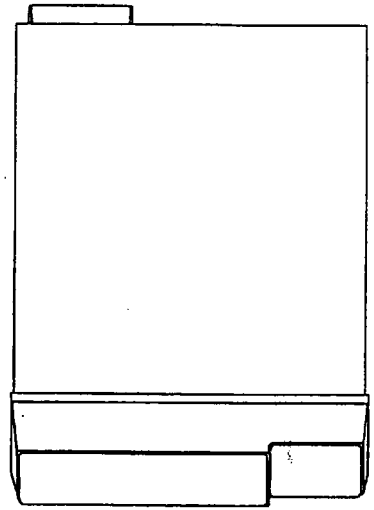
1) Place subjected to intense vibration; engine room, thin bulkhead, ceiling, etc.
2) Place exposed to air and splash.
3) Place with high temperature. (50°C or more)

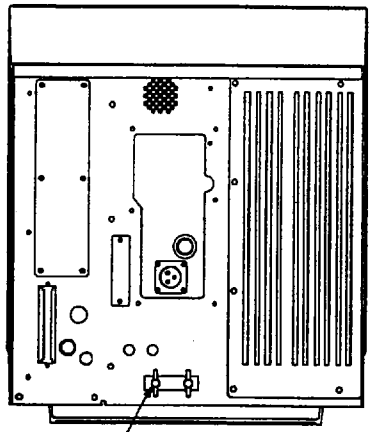
Further, do not mount it on the hull unit where intense vibration is expected.

1.5.2 Installation

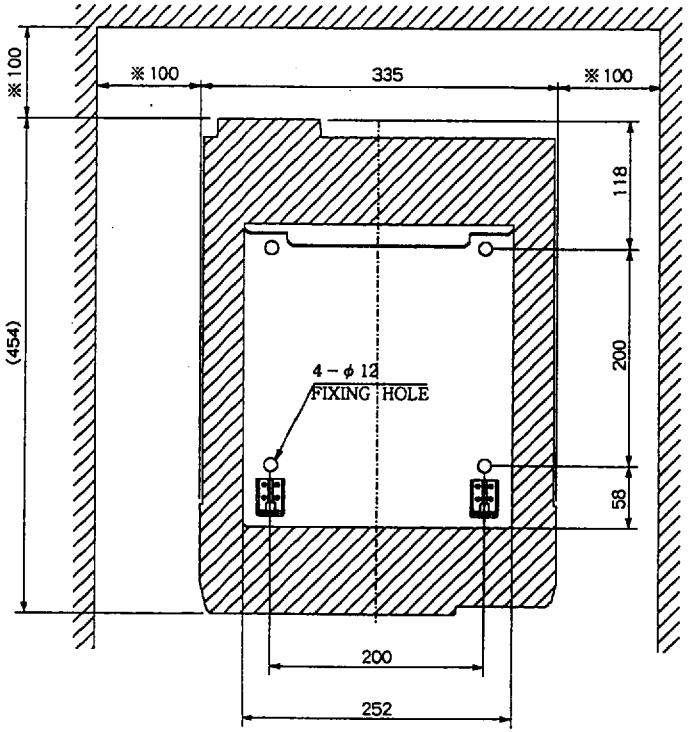
Orient the FORE mark on the unit toward the ship's bow and mount the unit level to within 5° in all directions



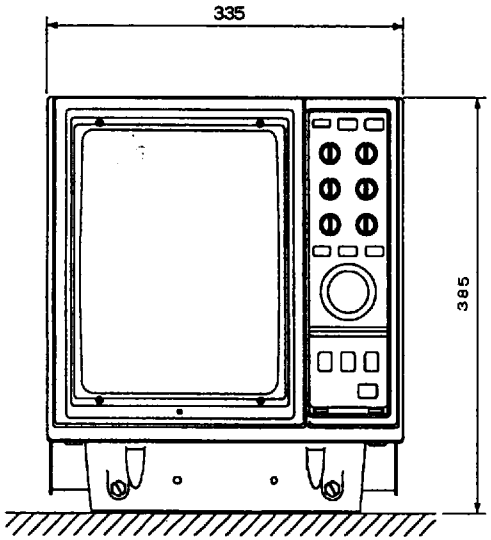


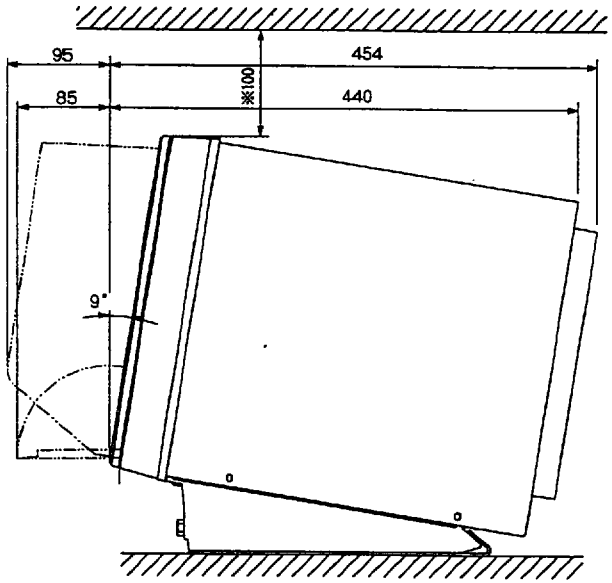


矢視 A (背 面 図)
"A" ARROW VIEW



取付寸法
MOUNTING DIMENSION



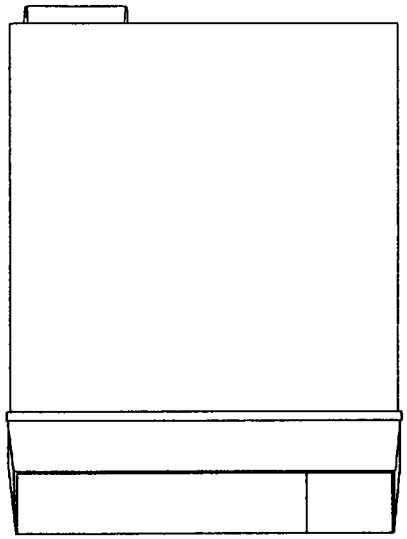


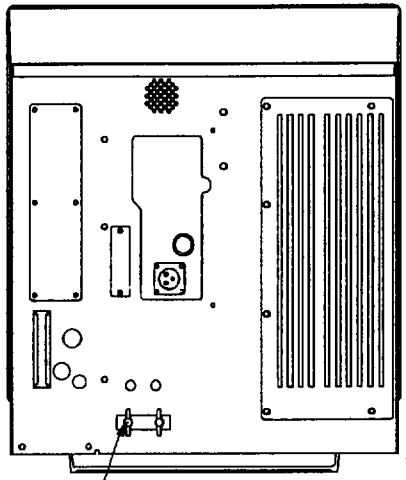
※ 印寸法は推奨サービス空間寸法。
※ RECOMMENDED SERVICE SPACE.

ITEM 品番	NAME 品名	MATERIAL 材質	Q'TY 数量	DWG. NO. 図番	REMARKS 摘要

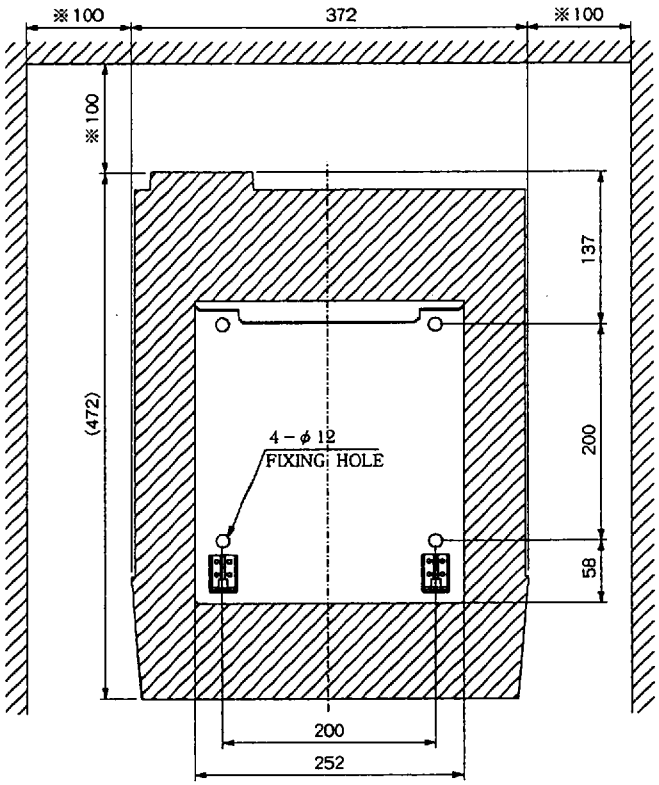
承認 APPROVED	APR・28・'92 T.JAKAJO	三角法 THIRD ANGLE		名称 TITLE	CH-340 指示器 DISPLAY UNIT
検図 CHECKED	APR・28・'92 M. USUDA	尺度 SCALE	/		
製図 DRAWN	Apr・28・'92 T. MIYOSHI	重量 WEIGHT	16 kg	図番 DWG.NO	C1282-G01-B

FURUNO

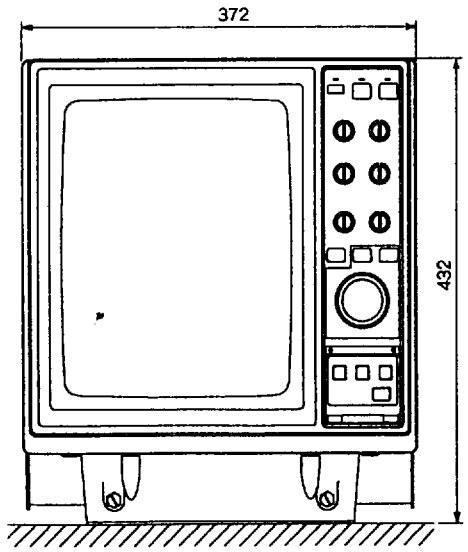


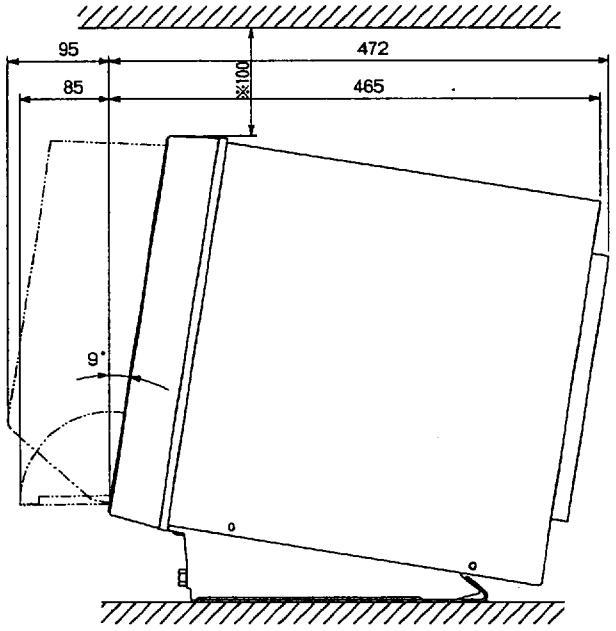


矢視 A (背 面 図)
"A" ARROW VIEW



取付寸法
MOUNTING DIMENSION

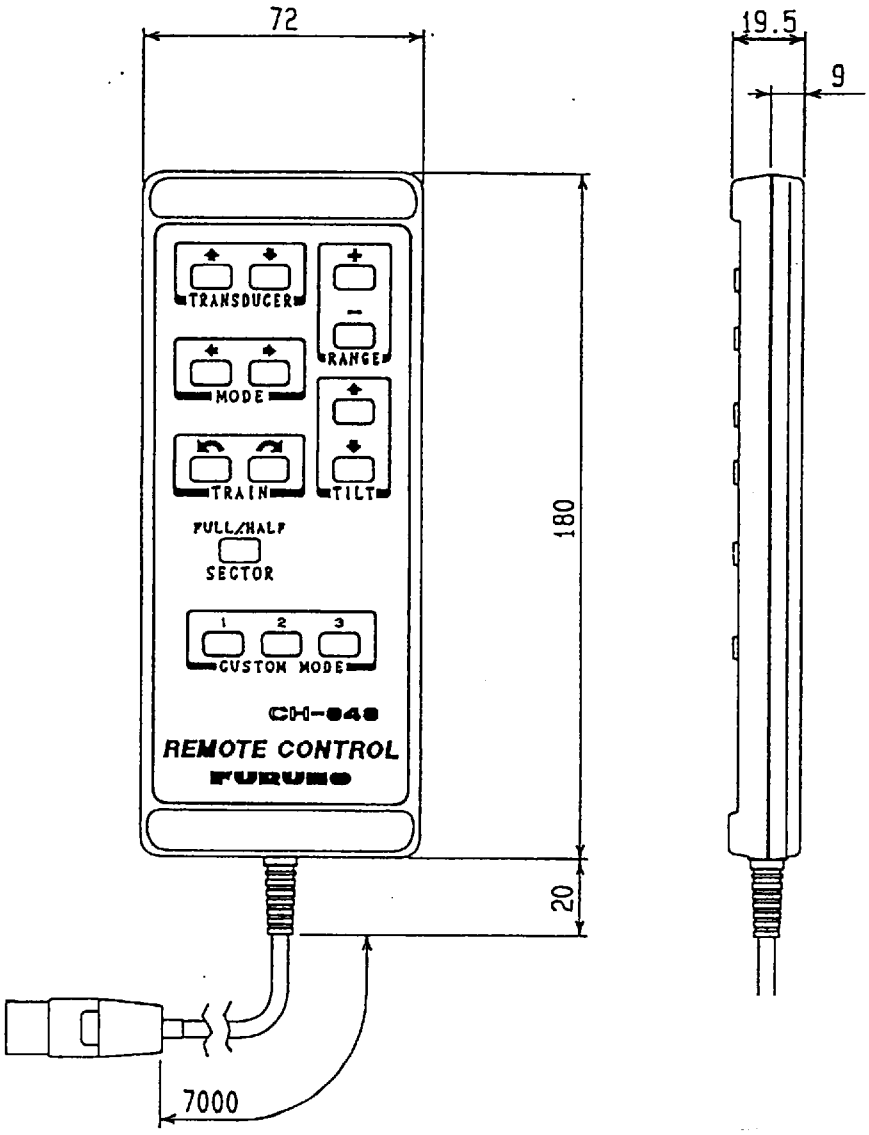




※ 印寸法は推奨サービス空間寸法。
※ RECOMMENDED SERVICE SPACE.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

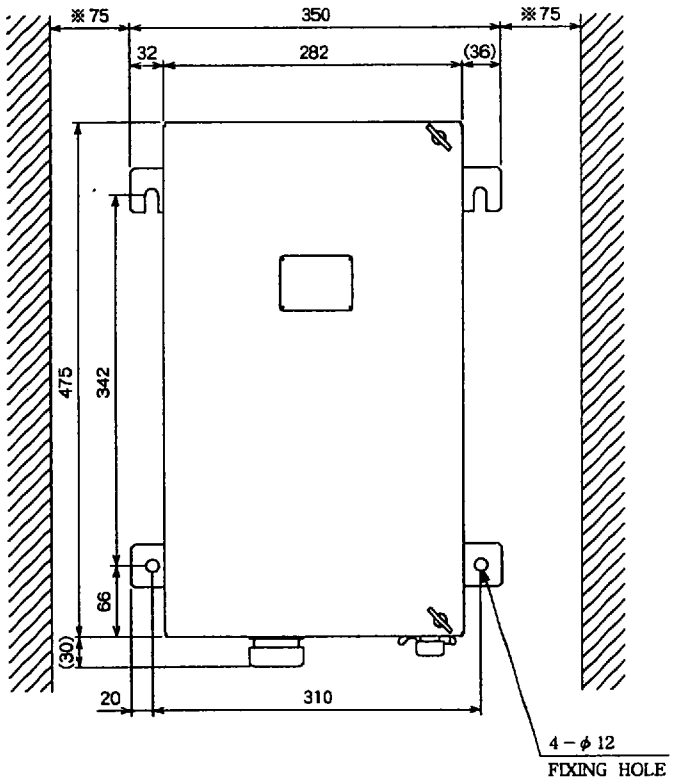
承認 APPROVED	APR・28・'92 T.[illegible]	三角法 THIRD ANGLE		名称 TITLE	CH-360 指示器 DISPLAY UNIT
検図 CHECKED	APR・28・'92 [illegible]	尺度 SCALE			
製図 DRAWN	Apr・28・92 T.Miyoshi	重量 WEIGHT	20 kg	図番 DWG.NO	C1283－G01－A

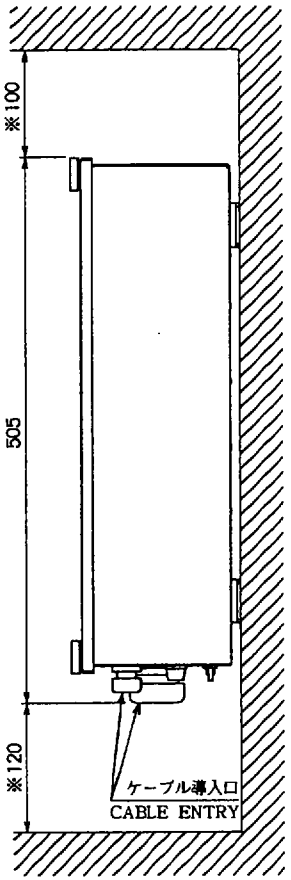


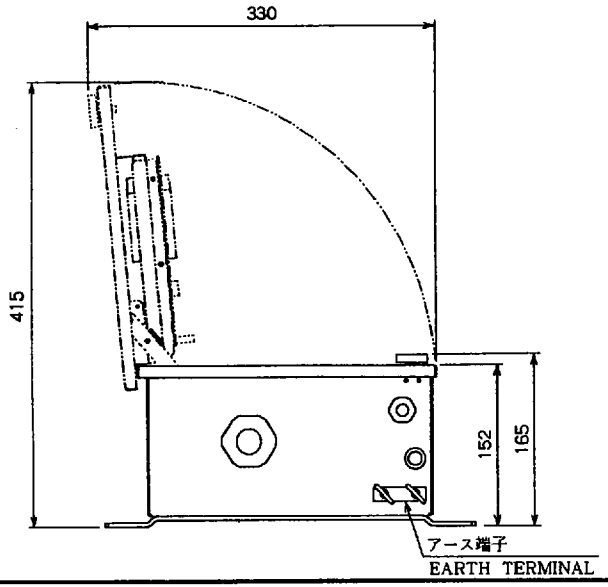
品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

承認 APPROVED	・ ・	三角法 THIRD ANGLE		名称 TITLE	CH-343 リモートコントロール REMOTE CONTROL
検図 CHECKED	・ ・	尺度 SCALE	1／2		
製図 DRAWN	・ ・	重量 WEIGHT	0.38 kg	図番 DWG.NO	C1282－G04－A

FURUNO





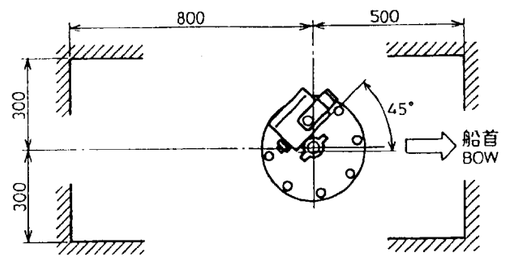


※ 印寸法は推奨サービス空間寸法。
※ RECOMMENDED SERVICE SPACE.

ITEM	NAME	MATERIAL	Q'TY	DWG. NO.	REMARKS

承認 APPROVED	APR・28・'92 T.NAKANO	三角法 THIRD ANGLE	名称 TITLE	CH-341	送受信装置 TRANSCEIVER UNIT
検図 CHECKED	APR・28・'92 M USUDA	尺度 SCALE			
製図 DRAWN	Apr・28・'92 T.MIYOSHI	重量 WEIGHT	8.5 kg	図番 DWG.NO	C1282－G02－A

推奨保守点検用スペース (尺度 1/20)
RECOMMENDED SERVICE SPACE SCALE(1/20)



注
NOTES :

1) 装備位置は船首から1/3 (小型船では1/2) 程度でキールから1m以内とする。
2) 上下シャフトの長さ (Ls) は、格納タンクの長さ (Lt) に、17mmを加えた値で切断すること。
   Ls = Lt + 110 (mm)
3) 上下装置の船首方向は左図の矢印 (⇨) で示す。
4) ドーム内部保守点検のため、上下装置上部には図示のスペースを設けるか、障害となる天井等に300mm × 300mm程度の角穴を明ける。

1) THE HULL UNIT IS GENERALLY PLACED ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF THE SHIP'S LENGTH FROM THE BOW ON THE FORE-AFT LINE AND BESIDE THE KEEL LINE (LESS THAN 1000mm FROM KEEL LINE).
2) THE MAIN SHAFT SHOULD BE CUT TO A LENGTH (Ls) GIVEN BY THE FOLLOWING EQUATION.
   Ls = Lt + 110 (mm) Lt : TANK LENGTH
3) ⇨ (ARROW) SHOWS FORE FOR HULL UNIT AND TANK.
4) IF THE OVERHEAD CLEARANCE SHOWN IN THE DRAWING IS NOT OBTAINED, MAKE A HOLE OF 300mm × 300mm ON THE CEILING FOR FACILITATING INSTALLATION AND FUTURE SOUNDOME SERVICE.

ITEM	NAME	MATERIAL	Q'TY	DWG. NO.	REMARKS
14	格納タンク RETRACTION TANK				
13	ガスケット GASKET		1		
12	座金 WASHER		2		
11	締付グランド CABLE GLAND		1		
10	ジュビリークリップ FASTENING BAND		1		
9	送受波器 TRANSDUCER		1		
8	ドーム (D) SOUNDOME (D)		1		
7	ドーム (U) SOUNDOME (U)		1		
6	グリスコットン GREASE COTTON		1		
5	フランジパッキン GASKET		1		
4	パイプクランプ PIPE CLAMP		1		
3	上下シャフト MAIN SHAFT		1		
2	グリスコットン押え台 GREASE COTTON RETAINER		1		
1	フランジ MAIN BODY FLANGE		1		

承認 APPROVED	APR・28・'92 T.UAKAUO	三角法 THIRD ANGLE PROJECTION	名称 TITLE	CH-342 上下装置 HULL UNIT
検図 CHECKED	APR・28・'92 M.USUDA	R 尺度 SCALE 1/10		
製図 DRAWN	Apr・28・'92 T.MIYOSHI	重量 WEIGHT kg	図番 DWG.NO.	C1282-G03-A

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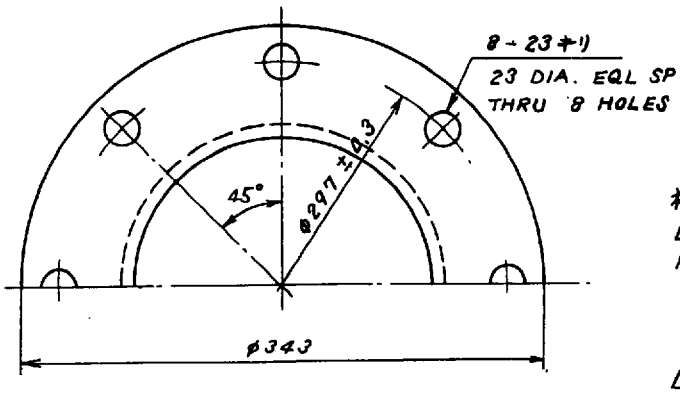
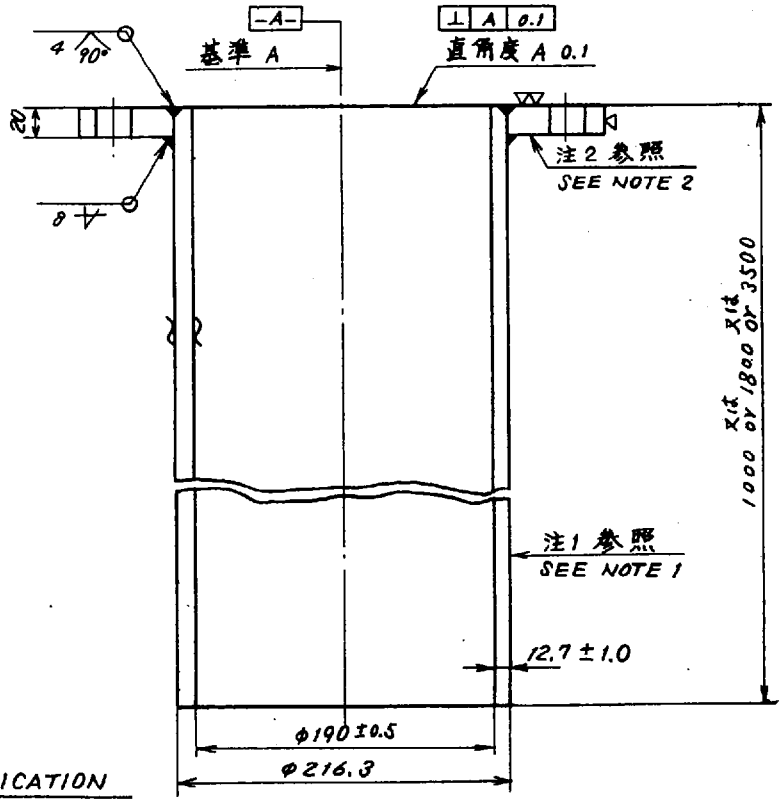


格納タンクの長さ；
LENGTH OF RETRACTION TANK;

$Lt =$ ＿＿＿＿ mm



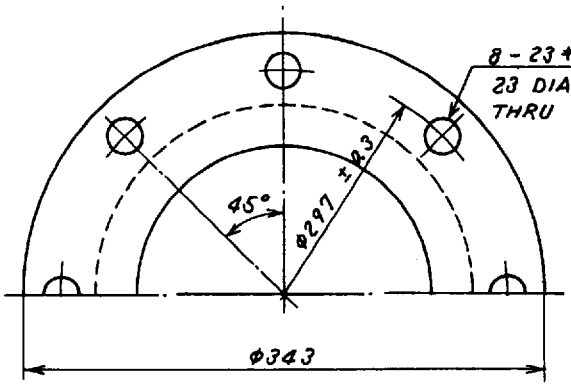
製作時の注意
NOTE FOR FABRICATION

1. 材料はSTPG38-E-C(圧力配管用炭素鋼鋼管 冷間仕上電気抵抗溶接鋼管 呼び径 200A スケジュール 80)を使用のこと。
2. 材料は SS41P を使用のこと。
3. タンク側面は大日本ペイント速乾鉛丹ペイントを2回塗布のこと。
4. タンク内面はビニールAF（中国塗料）を2回塗布のこと。
5. タンク上面は塗装しないこと。

1. USE STPG-38-E-C (8" SCHEDULE 80, JIS G3454, CARBON STEEL PIPE FOR PRESSURE SERVICE).
2. USE SS41P (JIS G3101, ROLLED STEEL FOR GENERAL STRUCTURE).
3. GIVE TWO COATS OF FAST-DRYING RED LEAD PAINT ON OUTSIDE OF TANK.
4. GIVE TWO COATS OF VINYL PAINT AF OR ANTI-FOULING PAINT ON INSIDE OF TANK.
5. DO NOT PAINT ON SURFACE OF FLANGE.

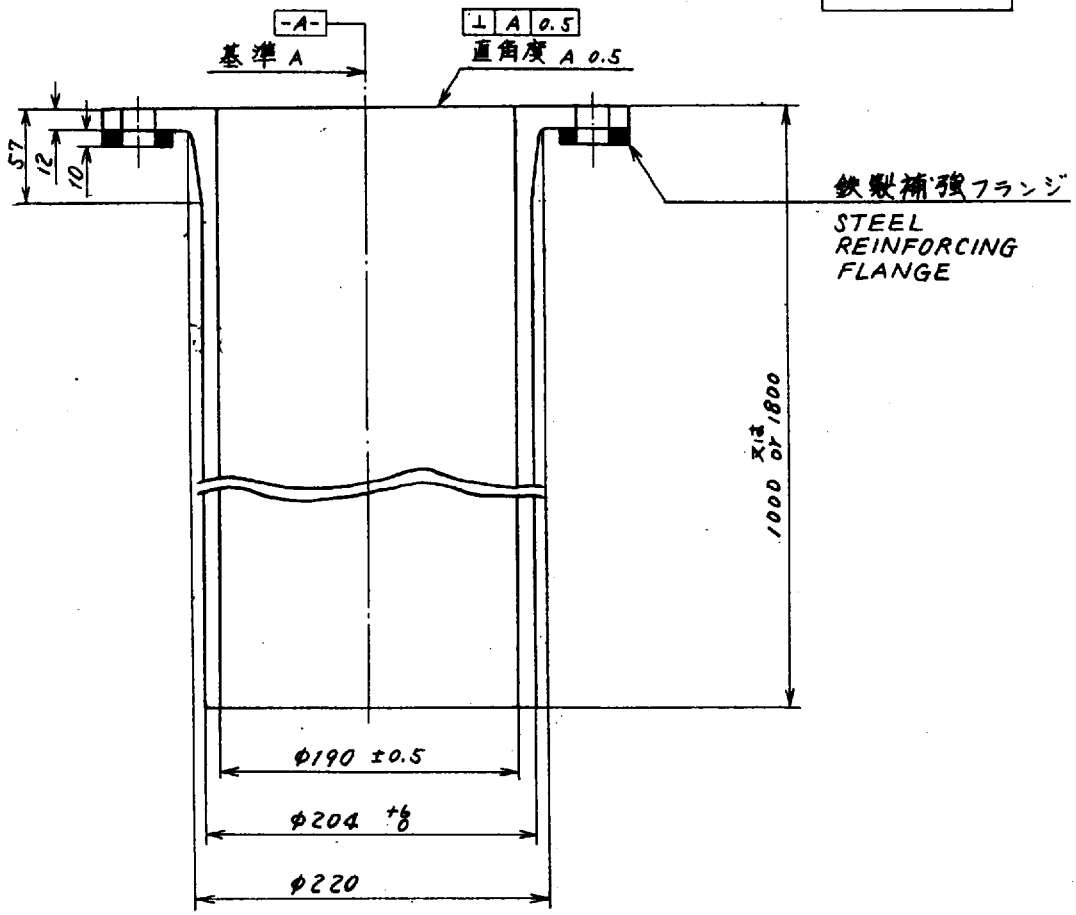
単位 UNIT: mm	品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	NOV. 9 '77	三角法 THIRD ANGLE PROJECTION		名称 TITLE	鉄製格納タンク外観図 STEEL RETRACTION TANK OUTLINE DRAWING
検図 CHECKED	NOV. 8 '77	尺度 SCALE	1/5		
製図 DRAWN	'77・6・28	重量 WEIGHT	1000mm : 73 1800mm : 123 kg 3500mm : 231	図番 DWG.NO.	C1229-006-G



格納タンクの長さ；
LENGTH OF
RETRACTION TANK;

Lt = [ ] mm



単位 UNIT: mm	品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED		三角法 THIRD ANGLE PROJECTION		名称 TITLE	FRP製格納タンク外観図 FRP RETRACTION TANK OUTLINE DRAWING
検図 CHECKED	July·18·'95	尺度 SCALE	1/5		
製図 DRAWN	July·18·'95 N. Tsuda	重量 WEIGHT	1000mm: 20kg 1800mm: 27kg	図番 DWG.NO.	C1229-007-E

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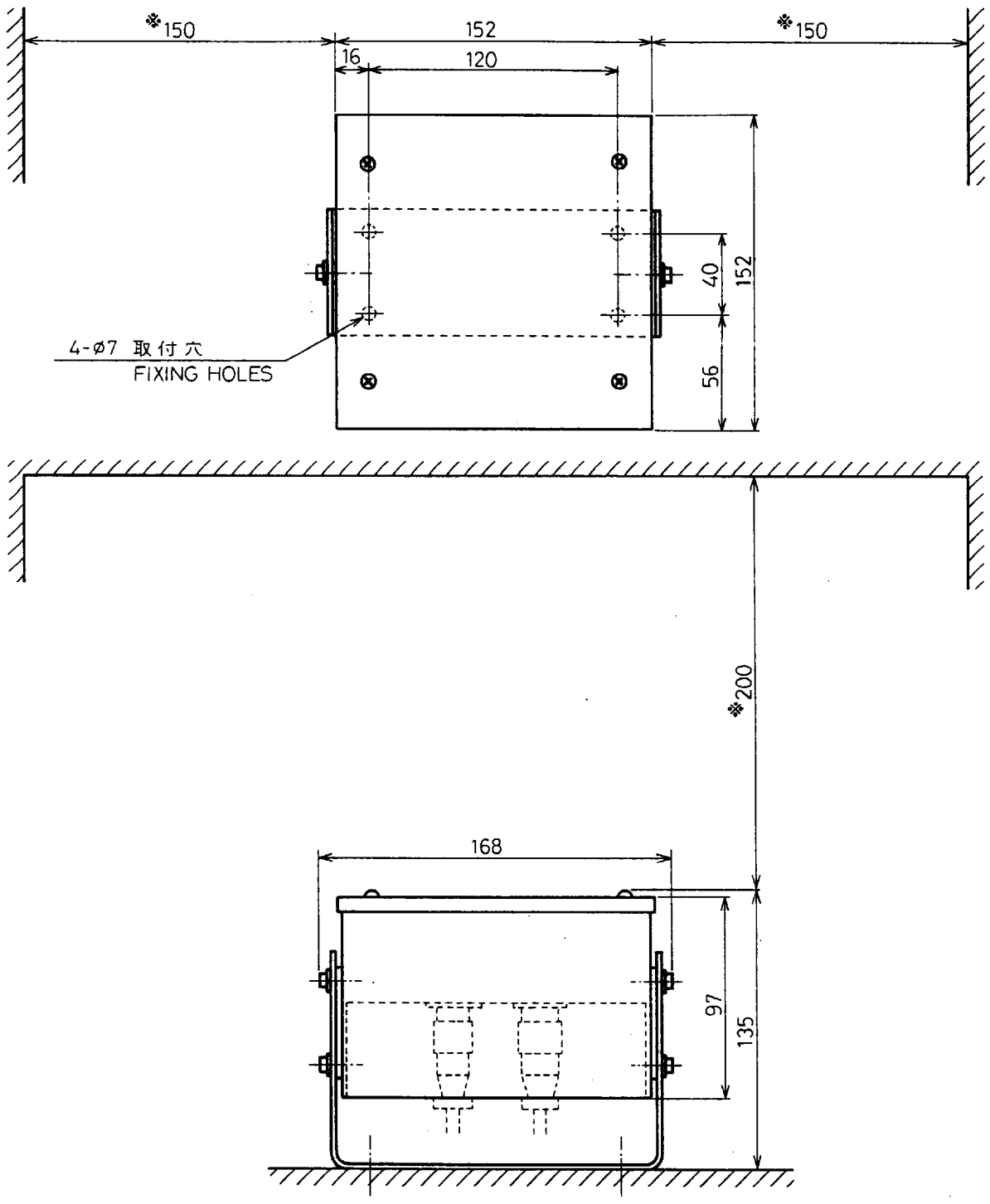
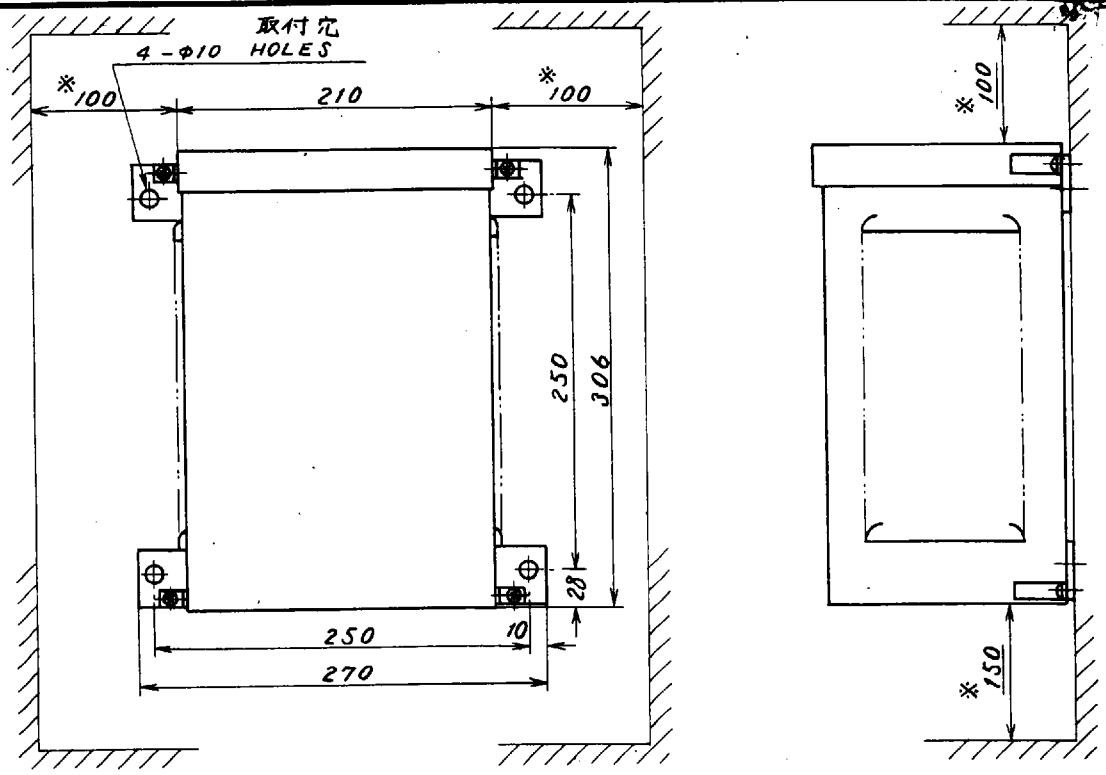
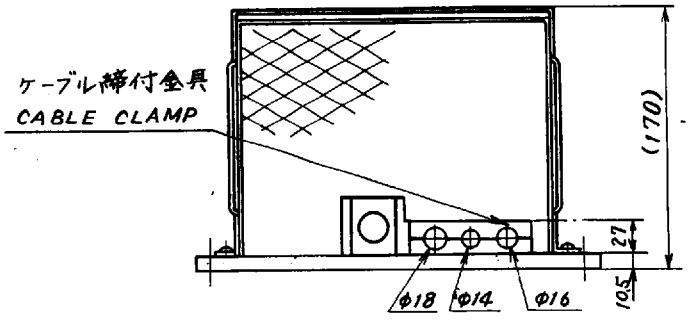


NOTE 1. 保守点検及び放熱用として ※印のスペースをとること。
DIMENSIONS MARKED "※" SHOW RECOMMENDED MAINTENANCE AND VENTILATION SPACE.
2. 船首マーク FORE を船首方向に向けて、筐体が水平になるように取り付けること。
ORIENT THE FORE MARK ON THE UNIT TOWARD SHIP'S BOW AND MOUNT THE UNIT LEVEL.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	JUL・20・'90 T.NAKAUO	三角法 THIRD ANGLE PROJECTION		名称 TITLE	動揺検出器
検図 CHECKED	Jul・20・'90 T.KODA	尺度 SCALE	1/3	MS-100	MOTION SENSOR
製図 DRAWN	JUL・20・'90 M.USUDA	重量 WEIGHT	2 kg	図番 DWG.NO.	C1278-G01-A





NOTE 1. ※: 推奨サービス空間
RECOMMENDED SERVICING CLEARANCE.

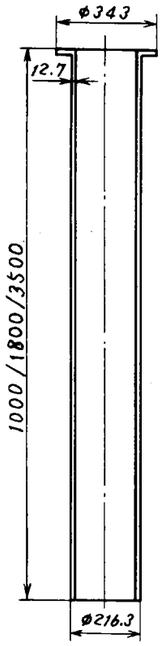
注 AC220V 入力に対しては T1401 の一次巻線を直列に接続する。

NOTE FOR 220VAC INPUT, CONNECT T1401 PRIMARY WINDINGS IN SERIES.

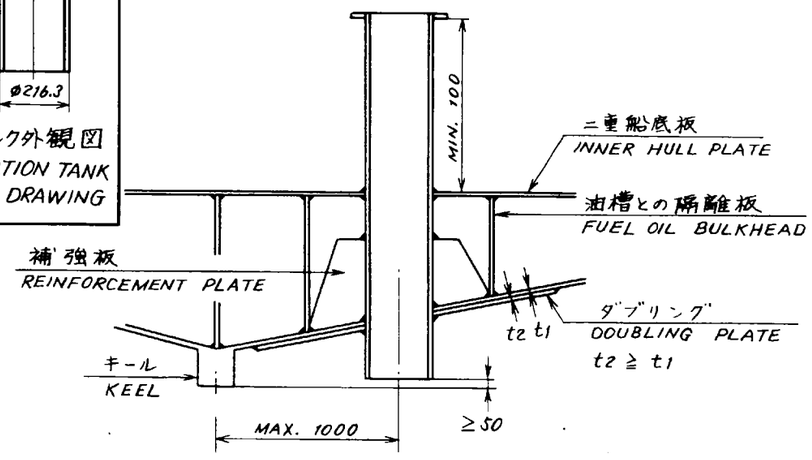
DRAWN Apr. 11 '97 T.YAMASAKI			TYPE RU-1746B-2
CHECKED APR. 15 '97 K.Kusudoki			名称 整流器
APPROVED			外寸図
SCALE 1/5	MASS 17 kg	APPLICABLE TO; (MODEL)	BLOCK NO. NAME RECTIFIER UNIT
DWG NO. C3002-002- M			OUTLINE DRAWING

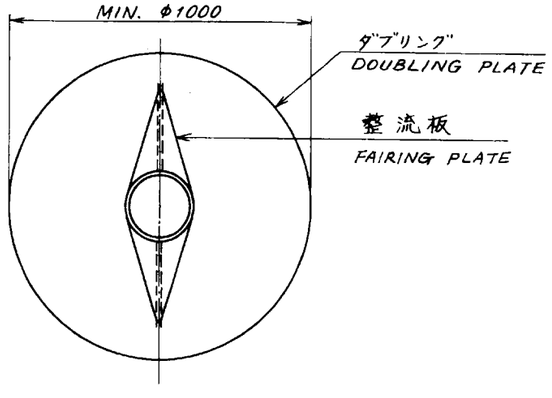
FURUNO ELECTRIC CO., LTD

FURUNO



格納タンク外観図
RETRACTION TANK
OUTLINE DRAWING





1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2) キールより1m以内。
   3) フランジのボルト締めのためフランジ下面と障害物（二重船底等）との間に100mm以上のスペースがあること。
   4) タンクの先端はキールの先端より50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 格納タンクの周辺の船底板に径1000程度のダブリングを施すこと。
3. 格納タンクの突出部分に網除けを兼ねた整流板を設けること。
4. 必要に応じて格納タンク周辺に油槽との隔離板をめぐらせること。
   またタンク周囲、3、4ヶ所で船底板に向けて補強板を溶接すること。

注：強度及び水密性について、船主、造船所担当者、施工者の間で充分協議し、取付位置、方法、材料等を決定すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW ON FORE-AFT LINE.
   2) WITHIN 1000 mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. DOUBLING PLATE OF ABOUT 1000 mm IN DIA. SHOULD BE INSTALLED BY THE SHIPYARD.
3. FAIRING PLATE (NET PROTECTOR) SHOULD BE INSTALLED AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM BY THE SHIPYARD.
4. IF REQUIRED, FUEL OIL BULKHEAD AND REINFORCEMENT PLATE SHOULD BE INSTALLED BY THE SHIPYARD.

CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

単位 UNIT: mm

CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	NOV. 9. '77	三角法 THIRD ANGLE PROJECTION		名称 TITLE	格納タンク船底装備図（鋼船） RETRACTION TANK INSTALLATION ON STEEL HULL
検図 CHECKED	NOV. 8. '77	尺度 SCALE	1/20		
製図 DRAWN	1977. 11. 7 M. Mea	重量 WEIGHT	kg	図番 DWG.NO.	C1243-017-F

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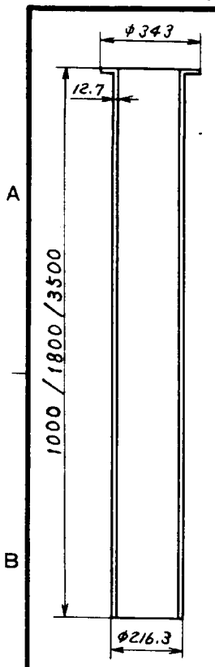
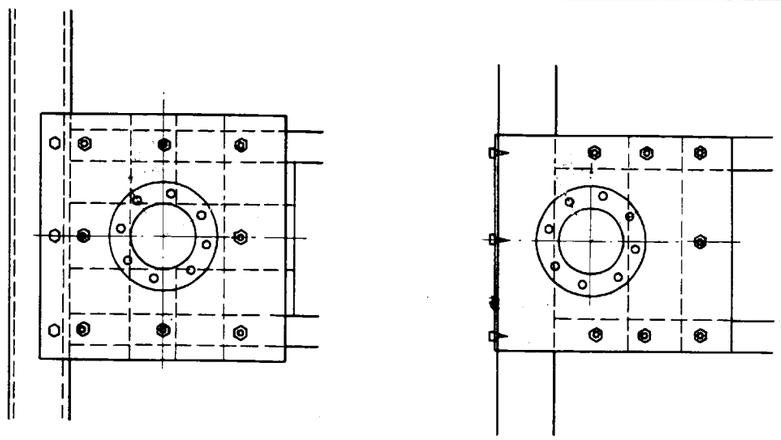
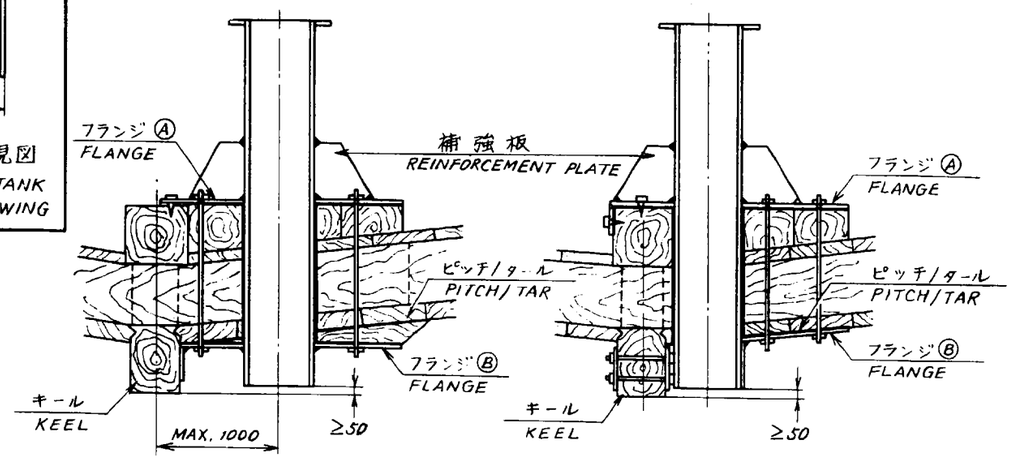
FURUNO

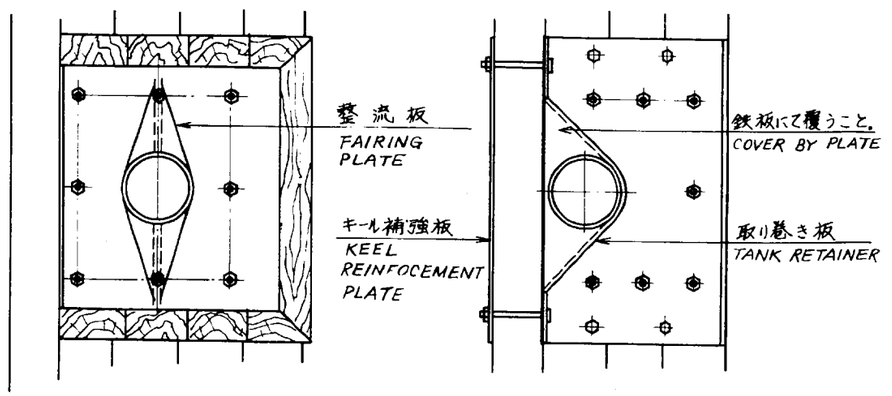
1 - 24



格納タンク外観図
RETRACTION TANK OUTLINE DRAWING







キールから離して装備
INSTALLATION OFF KEEL

キール脇に装備
INSTALLATION BESIDE KEEL

単位 UNIT : mm

1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2) キールより1m以内。
   3) フランジのボルト締めのため、フランジ下面と障害物（二重船底等）との間に100mm以上のスペースがあること。
   4) タンクの底部はキールの下端より50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 格納タンクの装備は次の要領を参考にして行うこと。
   1) 木のブロック等を使用して肋骨間の船底を充分補強する。補強された面は標準走航時水平になる様にする。
   2) タンクが通る穴を開ける。
   3) 必要個所に水密のためのピッチ等を充てん塗布した後、フランジ Ⓐ 及び Ⓑ をボルトナットで締めつけて固定する。
   4) タンクを貫通させ、タンクの底部がキール下端より50mm上になる様にフランジ Ⓐ 及び Ⓑ に溶接し、固定する。キール脇装備の場合は取り巻き板もタンクに溶接し、キールに固定する。
   5) 格納タンクの突出部分に網除けを兼ねた整流板を設ける。
   6) 必要に応じてタンクの周囲3,4ヶ所でフランジ Ⓐ に向けて補強板を溶接する。

注: 強度及び水密性について船主、造船所担当者、施工者の間で充分協議し、取付位置、方法、材料等を決定すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW ON FORE-AFT LINE.
   2) WITHIN 1000 mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. INSTALL THE RETRACTION TANK REFERRING TO THE PROCEDURE BELOW.
   1) REINFORCE THE HULL PLATE BETWEEN FRAMES WITH WOODEN BLOCKS OR SO. THE WOODEN BLOCKS SHOULD BE INSTALLED SO THAT THE FLANGE Ⓐ IS LEVELED WHEN THE SHIP IS NORMALLY TRIMMED AS IN THE DRAWING.
   2) CUT OUT A HOLE FOR PASSING THE TANK ON THE HULL BOTTOM, WOODEN BLOCKS AND FLANGES Ⓐ & Ⓑ.
   3) APPLY PITCH, TAR, ETC BETWEEN FLANGES Ⓐ & Ⓑ AND WOODEN BLOCKS OR HULL PALTE FOR SUFFICIENT WATERTIGHTNESS. THEN SETTLE THE FLANGES Ⓐ AND Ⓑ IN POSITION WITH BOLTS AND NUTS.
   4) WELD THE TANK TO THE FLANGES Ⓐ AND Ⓑ. WHEN THE TANK IS INSTALLED BESIDE THE KEEL, WELD THE TANK RETAINER TO THE FLANGE Ⓑ AND THE TANK. THEN FIX THE RETAINER TO THE KEEL WITH BOLTS AND NUTS.
   5) FAIRING PLATE (NET PROTECTOR) SHOULD BE INSTALLED AROUND THE PARTS OF THE TANK PROTRUDING FROM THE BOTTOM BY THE SHIPYARD.
   6) IF REQUIRED, REINFORCEMENT PLATE SHOULD BE INSTALLED BY THE SHIPYARD.

CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED	NOV. 9. '77	三角法 THIRD ANGLE PROJECTION		名称 TITLE	格納タンク船底装備図（木船）/ RETRACTION TANK INSTALLATION ON WOODEN HULL
検図 CHECKED	NOV. 8. '77	尺度 SCALE	1/20		
製図 DRAWN	1977. 11. 7 M. Ueda	重量 WEIGHT	kg	図番 DWG.NO.	C1243-018-F

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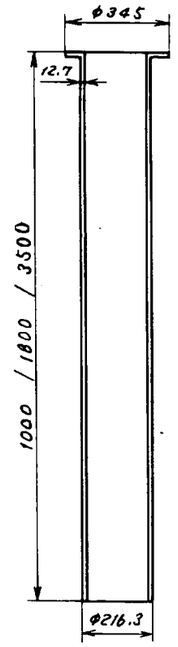
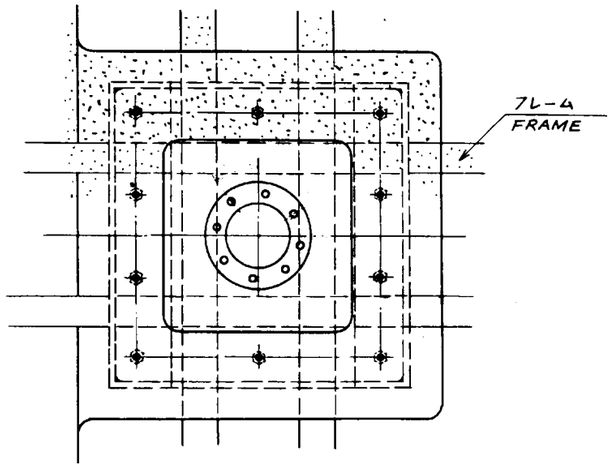
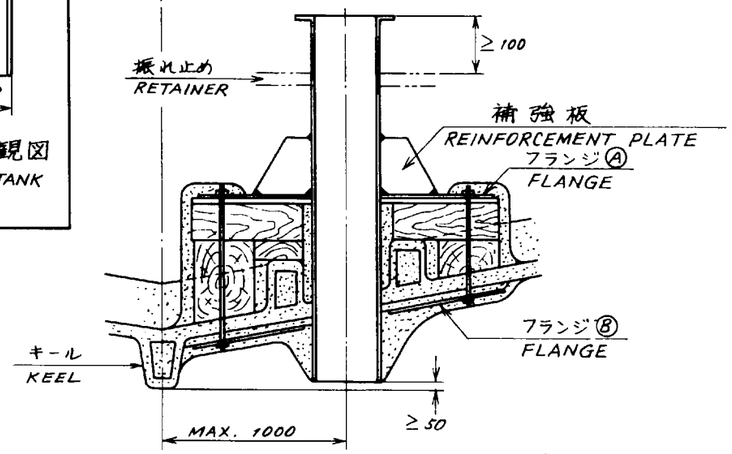
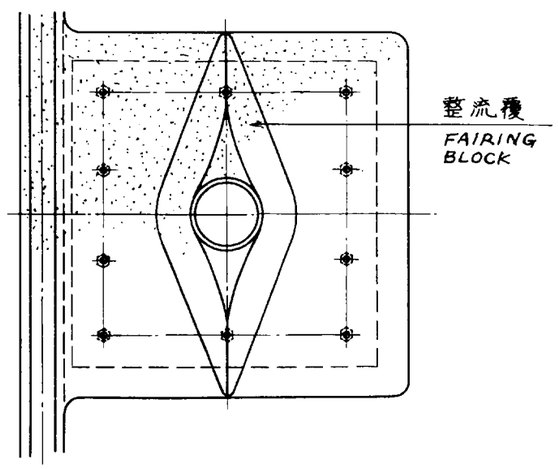


鉄製格納タンク外観図
STEEL RETRACTION TANK
OUTLINE DRAWING







1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から 1/3 (小型船の場合は 1/2) 程度。
   2) キールより 1m 以内。
   3) フランジのボルト締めのため フランジ下面と障害物 (二重船底等) との間に 100mm 以上のスペースがあること。
   4) タンクの先端はキールの先端より 50mm 上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 格納タンクの装備は、次の要領を参考にして行うこと。
   1) フレーム間の船底にタンクが通る穴をあける。
   2) タンクあるいは タンクと同径の中子を貫通させ、その回りに フランジⒶ の乗せられる取付台を作り FRP でフレーム、船底間に固定する。
   3) フランジ Ⓐ の取付穴に合わせて取付台にボルトを立てておく。必要があれば フランジⒷ を作り ボルトを船底から貫通させる。
   4) FRP 硬化後 タンクあるいは中子を抜き取る。
   5) フランジ Ⓐ をタンクに溶接する。
   6) フランジ Ⓐ 下面及びタンク外周に FRP－鉄接着剤を塗布した後 タンクを取りつける。
   7) 浸水を防ぐため充分に FRP で必要個所を塗り固める。特にタンク回りは流線型に成型し 水による抵抗及び気泡発生を最少限におさえる様努めること。
   8) 必要に応じて タンクのフランジ面下部 100mm の位置より隔壁等に向けて振れ止めを設けること。 また フランジ Ⓐ 溶接時、タンクの周囲 3, 4ヶ所で フランジ Ⓐ に向けて、補強板を溶接する。

注：強度及び水密性について、船主、造船所担当者、施工者の間で充分協議し、取付位置、方法、材料等を決定すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
   2) WITHIN 1000 mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100 mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50 mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

2. INSTALL THE RETRACTION TANK REFERRING TO THE PROCEDURE BELOW.
   1) CUT OUT A HOLE FOR PASSING THE TANK ON THE HULL PLATE.
   2) PASS THE TANK OR A CORE HAVING THE SAME DIAMETER AS THE TANK THRU THE HULL PLATE. MAKE A MOUNTING BED WITH WOODEN BLOCK AND FRP AROUND THE TANK OR THE CORE. THIS BED IS USED TO MOUNT THE FLANGE Ⓐ.
   3) WHEN FABRICATING THE MOUNTING BED, STAND THE BOLTS ON THE BED FOR FIXING THE FLANGE Ⓐ. IF NECESSARY, MAKE THE FLANGE Ⓑ TO ENSURE FIXING OF THE FLANGE Ⓐ.
   4) AFTER FRP IS STIFFENED, DRAW OUT THE TANK OR THE CORE FROM THE MOUNTING BED.
   5) WELD THE FLANGE Ⓐ TO THE TANK.
   6) APPLY A STEEL-FRP ADHESIVE TO THE TANK AND THE FLANGE Ⓐ, AND INSTALL THE TANK WITH FLANGE Ⓐ IN PLACE. SETTLE THE FLANGE Ⓐ WITH BOLTS AND NUTS.
   7) APPLY FRP AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM FOR SUFFICIENT REINFORCEMENT. MAKE A FAIRING BLOCK WITH FRP AROUND THE PROTRUDING PARTS OF THE TANK TO MINIMIZE THE EFFECT OF AERATION
   8) IF REQUIRED, INSTALL A REINFORCEMENT PLATE WHEN THE FLANGE Ⓐ IS WELDED TO THE TANK. IT IS ADVISABLE TO PROVIDE REINFORCEMENT ANGLES BETWEEN THE TANK AND THE ADJACENT BULKHEAD OR CEILING.

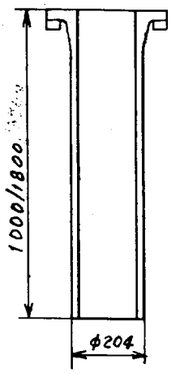
CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

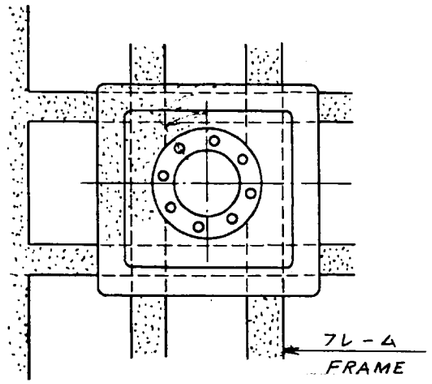
承認 APPROVED	NOV. 9. '77	三角法 THIRD ANGLE PROJECTION		名称 TITLE	鉄製格納タンク船底装備図(FRP船) STEEL RETRACTION TANK INSTALLATION ON FRP HULL
検図 CHECKED	NOV. 8. '77	尺度 SCALE	1/20		
製図 DRAWN	1977. 11. 7	重量 WEIGHT	kg	図番 DWG.NO.	C1243-019-F

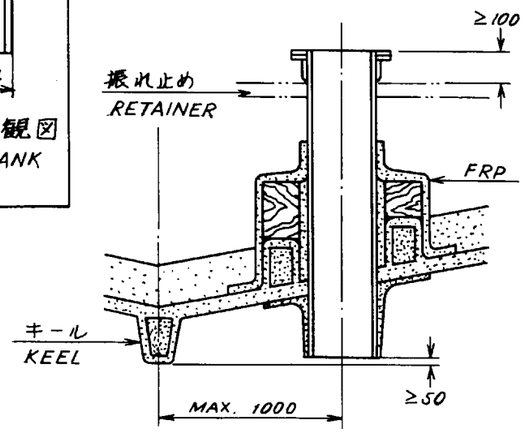
CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

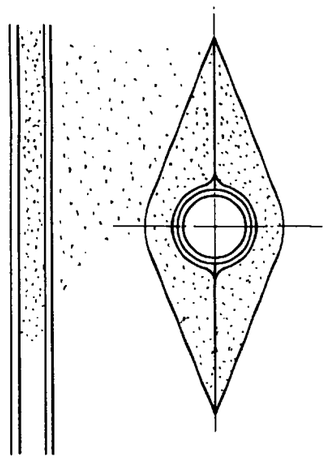
単位 UNIT: mm



FRP製格納タンク外観図
FRP RETRACTION TANK OUTLINE DRAWING







1. 格納タンクの装備は次の条件を満すこと。
   1) 取付位置は船首から1/3（小型船の場合は1/2）程度。
   2) キールより1m以内。
   3) フランジのボルト締めのためフランジ下面と障害物（二重船底等）との間に100mm以上のスペースがあること。
   4) タンクの先端はキールの先端より50mm上であること。
   5) タンクのフランジ面は標準走航時に水平であること。

2. 浸水を防ぐため充分にFRPで必要個所を塗り固める。特にタンク回りは流線型に成型し水による抵抗及び気泡発生を最少限におさえる様努めること。
3. 必要に応じてタンクのフランジ面下部100mmの位置より隔壁等に向けて振れ止めを設けること。

注：強度及び水密性について、船主、造船所担当者、施工者の間で充分協議し、取付位置、方法、材料等を決定すること。

1. SATISFY THE FOLLOWING CONDITIONS IN DECIDING THE RETRACTION TANK MOUNTING SITE.
   1) ABOUT 1/3 (1/2 IN CASE OF SMALL BOAT) OF SHIP'S LENGTH FROM BOW.
   2) WITHIN 1000mm FROM KEEL LINE.
   3) ALLOW CLEARANCE OF MORE THAN 100mm BENEATH TANK FLANGE TO FACILITATE BOLTING.
   4) KEEP LOWEST END OF TANK 50mm ABOVE BOTTOM OF KEEL.
   5) TANK FLANGE SHOULD BE EXACTLY HORIZONTAL WHEN SHIP IS NORMALLY TRIMMED.

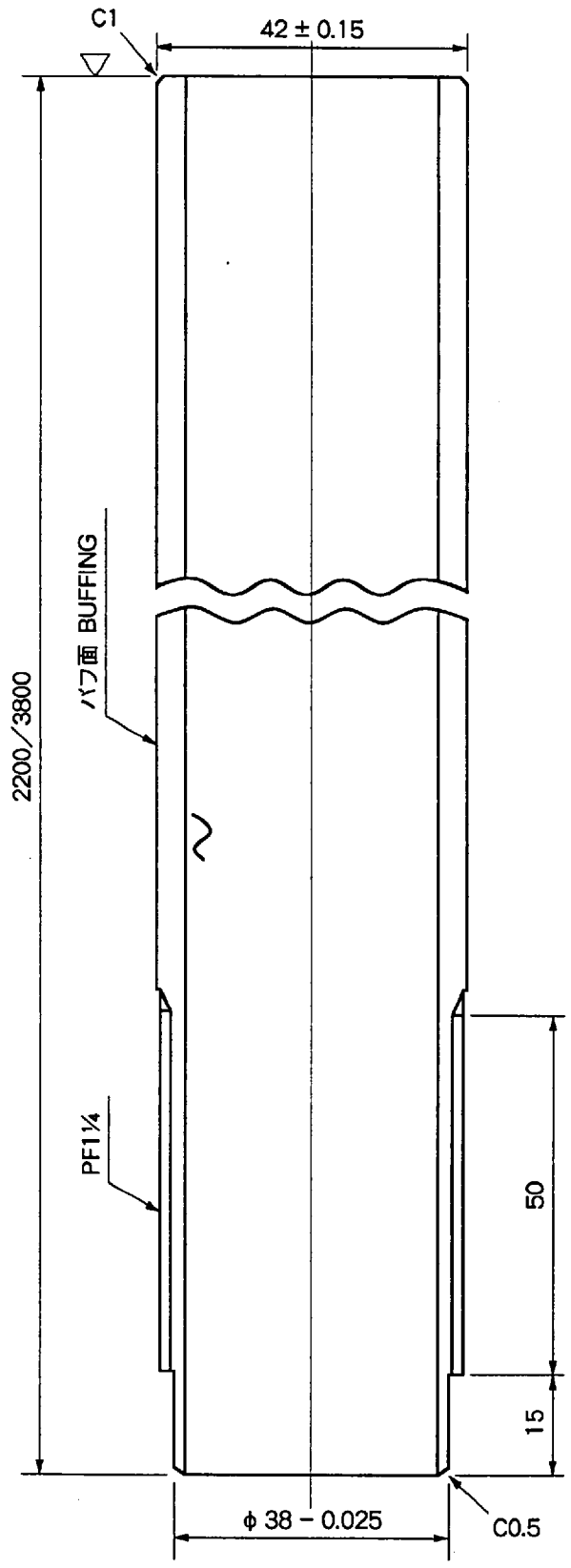
2. APPLY FRP AROUND THE PARTS OF THE TANK PROTRUDING FROM THE HULL BOTTOM FOR SUFFICIENT REINFORCEMENT. MAKE A FAIRING BLOCK WITH FRP AROUND THE PROTRUDING PARTS OF THE TANK TO MINIMIZE THE EFFECT OF AERATION.
3. IT IS ADVISABLE TO PROVIDE REINFORCEMENT ANGLES BETWEEN THE TANK AND THE ADJACENT BULKHEAD OR CEILING.

CAUTION: DISCUSSION SHOULD TAKE PLACE AND AGREEMENT BE REACHED WITH THE SHIPYARD FOR SUFFICIENT REINFORCEMENT AND WATERTIGHTNESS OF THE HULL TO COMPLY WITH THE REGULATIONS CONCERNED.

CSH-5
CSH-5 MARK-2
CH-12/14/16/24/26

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG.NO.	摘要 REMARKS

承認 APPROVED		三角法 THIRD ANGLE PROJECTION	名称 TITLE FRP製格納タンク船底装備図(FRP船) FRP RETRACTION TANK INSTALLATION ON FRP HULL
検図 CHECKED	May.14.1978	尺度 SCALE 1/20	
製図 DRAWN	July.18.1978 M.Mori.	重量 WEIGHT kg	図番 DWG.NO. C1220-038-F



注. 1) 外径42±0.15肉厚3.5の冷間仕上げ継目無ステンレス鋼管に、光輝焼鈍処理及びバフ研磨（＃300）後の材料を使用のこと。
2) 真直度は1／1000以内のこと。

NOTE 1) USE COLD FINISHING SEAMLESS STAINLESS STEEL TUBE, AFTER BRIGHT ANNEALING AND BUFFING, WITH OUTER DIAMETER 42 ± 0.15 AND THICKNESS 3.5.
2) TUBE SHOULD BE STRAIGHT TO WITHIN 1／1000.

CH-24/26/34/36

品番 ITEM	品名 NAME	材質 MATERIAL	数量 Q'TY	図番 DWG. NO.	摘要 REMARKS

承認 APPROVED	APR・28・'92 T.UAKANO	三角法 THIRD ANGLE		名称 TITLE	上下シャフト MAIN SHAFT
検図 CHECKED	APR・28・92 M. USUDA	尺度 SCALE	／		
製図 DRAWN	Apr・28・'92 T.MIYOSHI	重量 WEIGHT	kg	図番 DWG.NO	C1269 − G01 − A

FURUNO ELECTRIC CO., LTD.

CHAPTER 2. WIRING

2.1 Wiring between Units

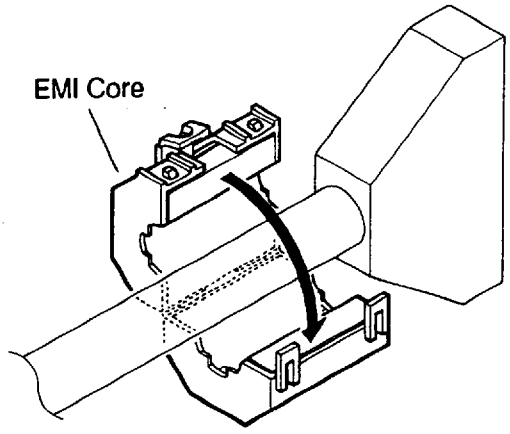
1) The signal cables are fitted with connectors at the factory. Plug them into receptacles on the display transceiver and hull units referring to the interconnection diagrams on page 2-2 to 2-4.

   The power cables should be arranged locally and the connector should be fitted.

2) Install the main switch for the hull unit at an easy to access location. Turning off this switch when the sonar is unused not only economizes the power consumption but also prevents the transducer from slipping down due to vibration, etc.: the electro-magnetic brake of the raise/lower motor is activated when the main voltage is shut down.

3) For Ac mains, use two rectifiers RU-1746B: one for the display and transceiver units and the other for the hull unit.

To prevent radio interference to other equipment, attach the EMI core supplied on the signal cable at the location near the connector for the display unit.



Note 1. ⬚ Option

2. ※ Shipyard supply

3. If necessary, pass cables through well-grounded pipe to prevent noise and mechanical damage.

CH-340/360
DISPLAY UNIT

MS-100
MOTION SENSOR

CH-343
REMOTE
CONTROL BOX

S06-6-10

① +
② –
③ SHIELD

COPPER STRAP

Install main switch near display unit.

※DPYC-1.25

SHIP'S MAINS { DC 24/32V
DC 24/32V
AC 100~115V/200~23V 50~60Hz 1ø

RU-1746B
RECTIFIER UNIT

AC 100~115V/200~23V 50~60Hz 1ø

※DPYC-1.25

RU-1746B
RECTIFIER UNIT

Change output tap to 30V.

CH-341
TRANSCEIVER UNIT

06P0190

TRANSCEIVER UNIT POWER SWITCH

REMOTE
Turned on/off with power switch on display unit. Normally set to this position.

OFF
Transceiver unit off.

LOCAL
Transceiver unit on.

Ground the cable by cable clamp

COPPER STRAP

Ground to ship's hull.

※DPYC-1.25

06S4061 5M

06S4050 15/30/50M

※DPYC-2.0

※DPYC-1.25

IMPORTANT

FOR AC MAINS, USE TWO RECTIFIERS: ONE FOR DISPLAY AND TRANSCEIVER UNITS AND THE OTHER FOR HULL UNIT.

CH-342
HULL UNIT

Remove shield case to lead soundome cable.

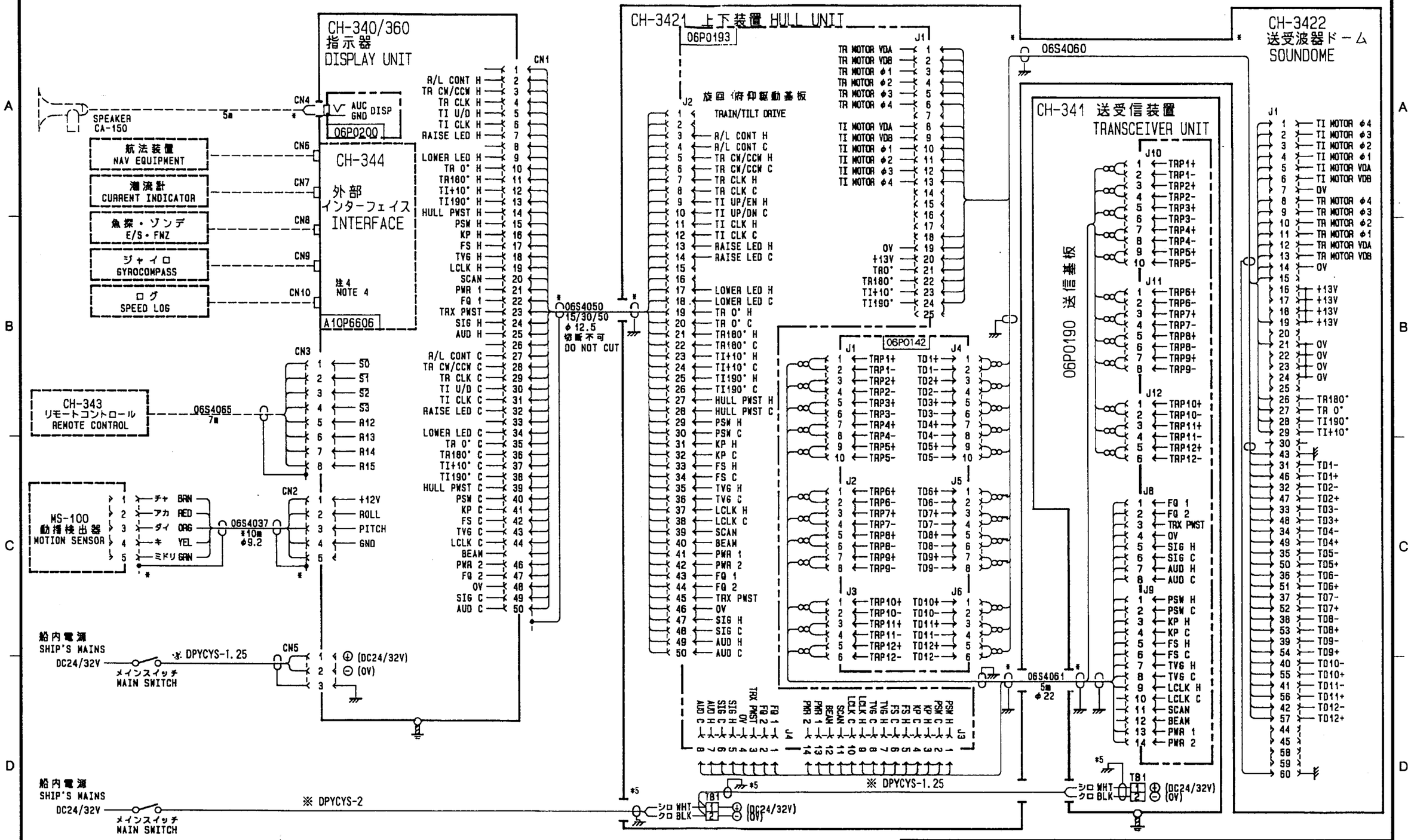
Connect as per sticker.

Ground shield through pcb fixing screws.

J1 J2 J3 J4 J5 J6 TB1

承認 APPROVED		名称 TITLE	CH-34/36 CABLING DIAGRAM
検図 CHECKED			
製図 DRAWN		図番 DWG.NO	

FURUNO ELECTRIC CO., LTD.

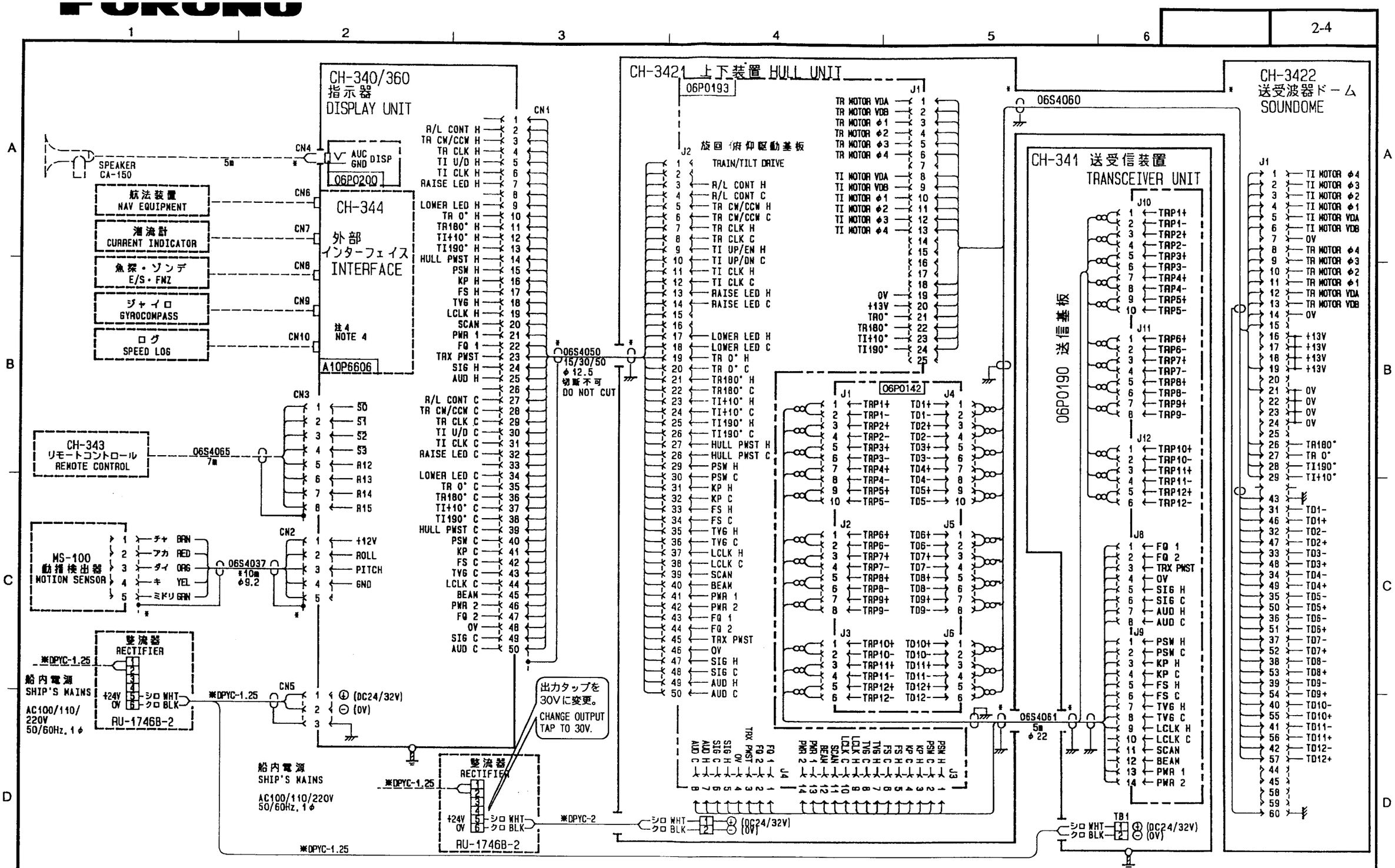


注
1.----オプション
2.※ 造船所支給
3.* ケーブル端はプラグ又は圧着端子を装着済
4. 外部インターフェイスに関する結線は、外部インターフェイス相互結線図を参照のこと。
*5 ケーブルのシールド編組を端子台の止めネジで接地。

NOTE
1.---OPTIONAL SUPPLY.
2.※ SHIPYARD SUPPLY.
3.* PLUG OR CRIMP-ON LUGS ARE FACTORY-FITTED.
4. REFER TO INTERFACE INTERCONNECTION DIAGRAM.
*5 GROUND SHIELD CABLE BY TERMINAL BOARD FIXING SCREW.

承認 APPROVED	APR・28・'92 T. NAKANO	名称 TITLE	CH-34/36 相互結線図 (DC) INTERCONNECTION DIAGRAM
検図 CHECKED	APR・28・'92 M. USUDA		
製図 DRAWN	APR・28・'92 T. MIYOSHI	図番 DWG.NO	C1282 − C01 − C

FURUNO ELECTRIC CO., LTD.



注
1.----オプション
2.* 造船所支給
3.# ケーブル端はプラグ又は圧着端子を接続済
4. 外部インターフェイスに関する結線は、外部インターフェイス相互結線図を参照のこと。

NOTE
1.---OPTIONAL SUPPLY.
2.* SHIPYARD SUPPLY.
3.# PLUG OR CRIMP-ON LUGS ARE FACTORY-FITTED.
4. REFER TO INTERFACE INTERCONNECTION DIAGRAM.

承認 APPROVED	APR・28・'92 T. NAKANO	名称 TITLE	CH-34/36 相互結線図 (AC) INTERCONNECTION DIAGRAM
検図 CHECKED	APR・28・'92 M. USUDA		
製図 DRAWN	APR・28・'92 T. MIYOSHI	図番 DWG.NO	C1282 − C02 − B

CSH-5 MARK-2
CSH-5 指示器
CH-34/36 DISPLAY UNIT

CSH-5060
CH-344
外部インターフェイス

INTERFACE
MODULE

CH-34 CSH-5
CH-36

NAV
CN-6 CN-A3

TD-H 1
TD-C 2
RD-H 3
RD-C 4
DTR-H 5
DTR-C 6
DSR-H 7
DSR-C 8
NC 9
GND 10

シロ WHT
クロ BLK
ミドリ GRN
キ YEL

*2

CO-SPEVV-SB-C, 0.2sq-5P (オプション OPTION)

EV-SA7/0.16×2P 5m, 6.0mmφ

J102
1 GRN
2 YEL
} CIF TXD

潮流計
CURRENT
INDICATOR
CI-610

J103
9
10
11
18
25
} NMEA TXD

CI
CN-7 CN-A4

TD-H 1 アカ RED
TD-C 2 キ YEL
RD-H 3 ミドリ GRN
RD-C 4 キ YEL
DTR-H 5 アオ BLU
DTR-C 6 キ YEL
DSR-H 7 シロ WHT
DSR-C 8 キ YEL
NC 9
GND 10 クロ BLK, キ YEL

*2

CO-SPEVV-SB-C, 0.2sq 5P
(オプション OPTION)

DA-15P
CIF SIG OUT (CI-30/50)
DATA OUT (CI-20)

ミドリ GRN 1
キ YEL 2
アカ RED 3
キ YEL 4
シロ WHT 5
キ YEL 6
アオ BLU 7
キ YEL 8
キ YEL 9
クロ BLK 15

*1

潮流計
CURRENT IND.
CI-20/30/50

SRCN6A16-10P

キ YEL 3
ミドリ GRN 4
キ YEL 9
シロ WHT 10
キ YEL
クロ BLK 8

*2

分配器
MULTI-
DISTRIBUTOR
MD-300

J7-J12

アカ RED 1
キ YEL 2
ミドリ GRN 3
キ YEL 4
ヨビセン SPARE WIRE 5

AD コンバータ
AD CONV
AD-100

SRCN6A16-10P

キ YEL 1
ミドリ GRN 2
キ YEL 3
アカ RED 4
キ YEL 5
クロ BLK
キ YEL
シロ WHT 8
キ YEL 9
アオ BLU 10

*2

分配器
MULTI-
DISTRIBUTOR
MD-300

OUTPUT
1
2
キ YEL 3
ミドリ GRN 4
5
6
7
8
9
10

分配器
MULTI-
DISTRIBUTOR
MD-300

ES
CN-8 CN-A5

02S8040, 6m

AC-SIG 1 シロ WHT
DC-SIG 2
KP 3 キ YEL
WL 4 モモ PNK
SONDE 5 ミドリ GRN
NC 6
GND 7 アオ BLU

インターフェイス
INTERFACE
VI-1100A

魚探
ES

*2

GYRO
CN-9 CN-A6

AD-DATA-H 1 アカ RED
AD-DATA-C 2 キ YEL
AD-CLK-H 3 ミドリ GRN
AD-CLK-C 4 キ YEL
GND 5 シロ WHT

CO-SPEVV-SB-C, 0.2sq 5P
(オプション OPTION)

*2

潮流計 CURRENT IND.
スピードログ SPEED LOG.

J206
シロ WHT 3
クロ BLK 4
CI-310

TB2
11 (13)
12 (14)
CI-610

TB3
1
2
DS-700

RADAR
ML-20/21

LOG
CN-10 CN-A7

LOG-H 1 シロ WHT
LOG-C 2 クロ BLK
GND 3

250V
DPYC-1.25

造船所支給
SHIPYARD
SUPPLY

DATA OUT
*3
シロ WHT 1
クロ BLK 2
6

GPS
GP-500
GP-70

GPIF
ミドリ GRN 1
キ YEL 2
3
4
5
6
7
8
9
10

ロラン
LORAN
LC85
LC-90/88
LC-880/90 MK2

J2
* (CIF-B 又は OR C)
ミドリ GRN 1
キ YEL 2
3
4
5
6
7
8

ハイブリット
インターフェイス/NNSS
HYBRID INTERFACE
SATNAV etc

IF-5000/2000/7000
*FSN-70
FP-70 (IF-5001)

DATA IN/OUT
ミドリ GRN 1
キ YEL 2
13
14
15

GPS プロッタ
ロランCプロッタ
GPS PLOTTER
LORAN C PLOTTER
GP-1500, LP-1000/1200/1250/1300

OUTPUT 1
OUTPUT 5
ミドリ GRN 1
キ YEL 2
10

分配器
MULTI-
DISTRIBUTOR
MD-500

*2

*1 ケーブルクランプでアースにおとす。
GROUND THRU CABLE CLAMP.

*2 コネクタケースでアースにおとす。
GROUND THRU CONNECTOR CASE.

*3 出荷時プラグ接続済。ケーブルの未使用線は個別にテーピング。
PLUG IS FACTORY-SOLDERED.
UNUSED CORE LEADS MUST BE ISOLATED INDIVIDUALLY.
DO NOT GROUND THEM.

承認 APPROVED	JUL. 13. '90 T.NAKANO	名称 TITLE	外部インターフェイス相互結線図
検図 CHECKED	JUL. 9. '90 M. ISUDA	CSH-5060 CH-344	INTERFACE MODULE CONNECTION DIAGRAM
製図 DRAWN	JUNE. 14. '90 T. MIYOSHI	図番 DWG.NO.	C1273-C02-D

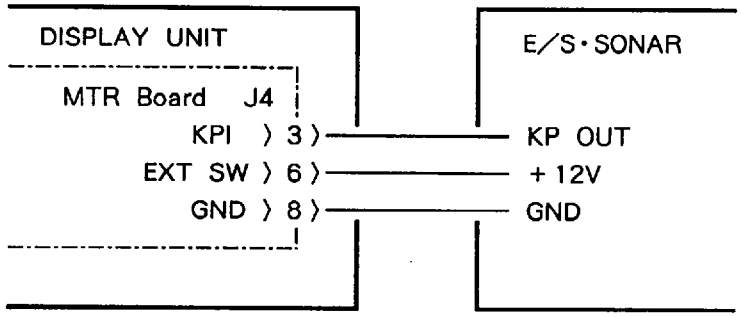
CSH-5 MARK-2
CSH-5
CH-34/36

FURUNO ELECTRIC CO., LTD.

2.2 Synchronizing Transmission with Echo Sounder or Other Sonar

To synchronize the transmission of the CH-34/36 with an echo sounder and other type of sonar, make connections as shown below.

1) Connection

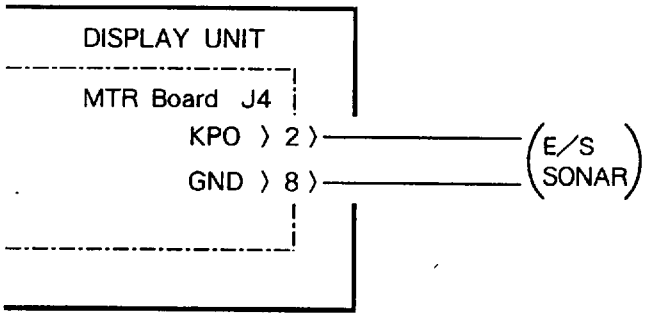


CH-34/36 accepts a positive KP with amplitude of 5V to 15V.

2) Menu Setting

Set the TX EXT SYNC item of the menu to ON. Refer to the operator's manual for operation on the menu.

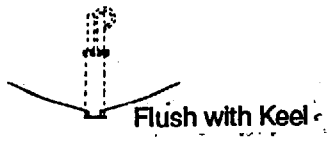
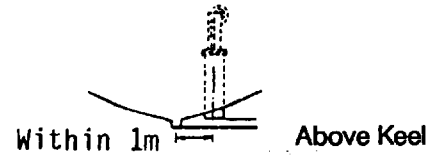
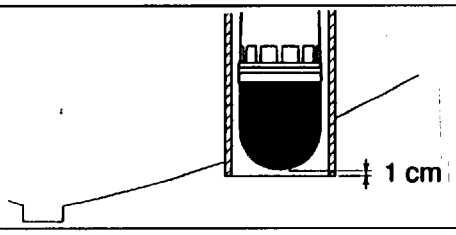
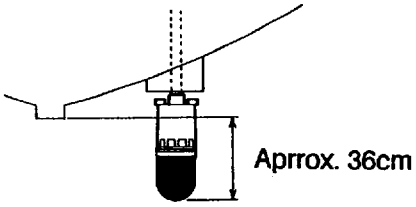
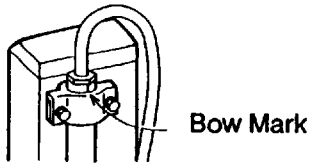
Note: To output KP of the CH-34/36 to other sonar or echo sounder, make connections as shown below.



CHAPTER 3. AFTER-INSTALLATION CHECK AND ADJUSTMENT

3.1 General Check

3.1.1 Check on Slipway or in Dry-dock

No.	Check Item	Ratings	Refer to
1	Retraction Tank Level	On-keel Installation  Off-keel Installation 	1-1 1-18
2	Clearance between transducer and bottom of retraction tank when transducer is completely retracted by hand crank.		1-8 1-18
3	Transducer Travel (lowered by hand crank) **Note:** When checking, a clearance of approximately 1m is required under the bottom of the transducer.		
4	Manual Raise/Lower of Transducer	Transducer can be raised/lowered smoothly with hand crank	1-11
5	Transducer Heading	 Bow mark inscribed on main shaft should face ship's bow.	1-8

Before the ship is launched, check the following points

No.	Check Item	Ratings	Refer to page
1	Wiring Check	1) All cables are correctly connected. 2) All lead wires are tightly fixed with contact pins or crimp-on lugs. 3) All screws are securely tightened. 4) Cables are firmly bound. 5) Cable shields are properly grounded.	
2	Rejecting Source of Noise and Interference	1) Noise generating machines are not placed nearby, e.g., motor, radiotelephone, transmitter unit, TV set, etc. 2) Magnetic devices are not placed in the vicinity of display unit.	
3	Grounding	Each unit is grounded with a copper strap.	1-13
4	Ship's Mains Voltage	Ship's mains voltage is stable at 24/32VDC.	
5	Watertightness	Water should not leak from the main body flange or along the main shaft.	
6	Heading Alignment	A target is displayed in the correct bearing.	3-4

3.2 Adjustment of Transceiver Unit

3.2.1 Selecting Audio Frequency

Select audio frequency 1000Hz or 900Hz by jumper connector JP2 on 06P0192 board. The factory setting is 1000Hz. Refer to Fig.3-1.

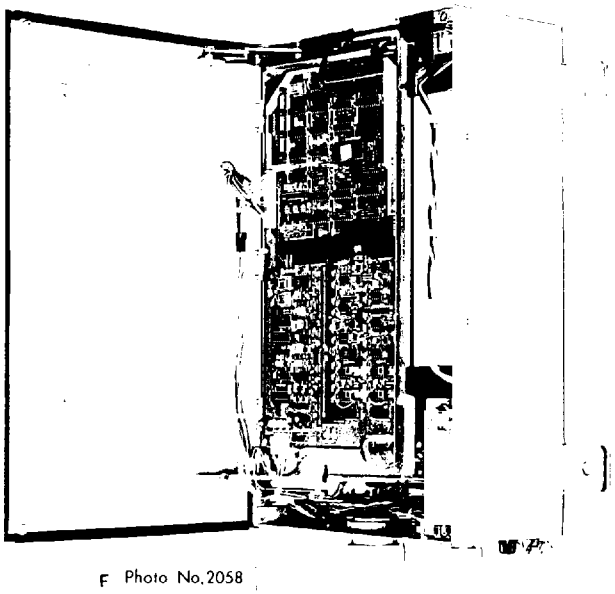
HI ----- 1000Hz
LO ----- 900Hz

3.2.2 Signal Offset Adjustment

When noise appears on the screen, adjust R61 (offset) on 06P0192 board. Turning R61 clockwise slices off low level signals in similar way to the CLUTTER control on the display unit.(While the CLUTTER control on the display unit eliminates low level signals without changing signal level of strong signals, R61 shifts signal level of all signals.) When the offset adjustment is unnecessary, set R61 fully counterclockwise. Refer to Fig.3-1 for location of R61.

3.2.3 Adjustment of Horizontal Beamwidth

When the user wishes echoes to be displayed with a high resolution, turn R40 on 06P0192 board clockwise for sharper horizontal beamwidth. Do not turn it excessively clockwise, or an echo which should be displayed as single solid mass may become unsolid or split into small few masses. Normally it is set at the mid-point of its travel.



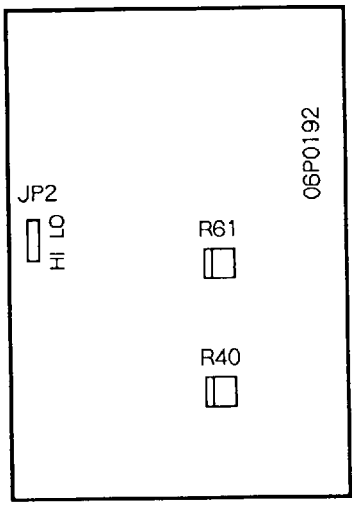
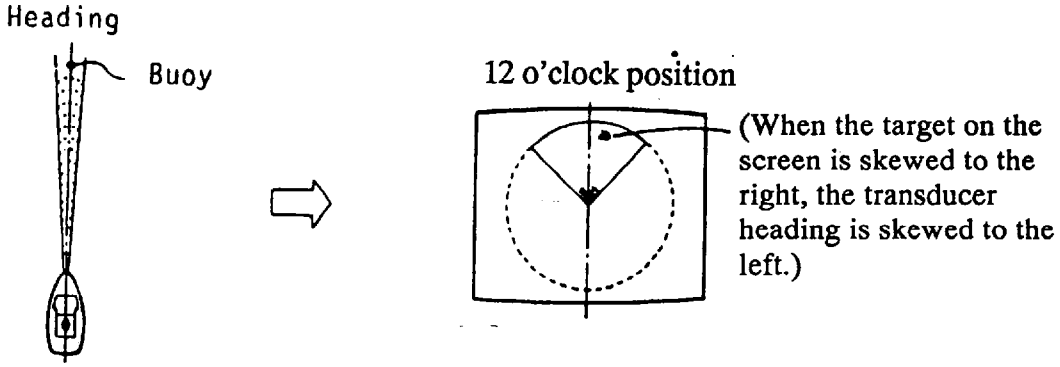


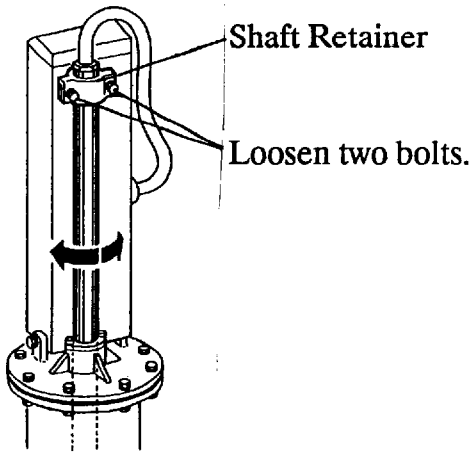
Fig.3-1

3.2 Heading Alignment

1. To correct the ship's heading, locate a target in the bow direction (a buoy, etc.) and display it on the screen at a close range. The heading alignment is correct when the target is displayed at 12 o'clock direction on the screen.



2. When the heading alignment is incorrect, rotate the main shaft after loosening four bolts on the shaft retainer.



3. After the adjustment, retighten the bolts.

3.3 Motion Sensor (Option) Adjustment

As started in paragraph 1-5, when the ship has a semi-permanent inclination (stationary inclination of ship), offset it as follows. Inclination of up to 10° approximately can be corrected.

1. Turn on the power while pressing the **EVENT** key and keep the **EVENT** key pressed until beep sounds. The selfcheck menu will be displayed.

2. Select KEY test item and press the **MENU** key to display the key test screen.

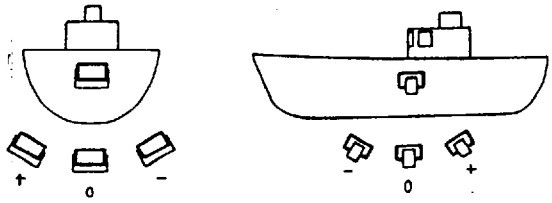
ROLL/PITCH angles

PANEL	REMOTE CONTROL
	TRANSDUCER RANGE
MODE : 3 RANGE : 2	↑ : 0 ↓ : 0 + : 0
	MODE
TR : 0 GAIN 255	← : 0 → : 0 − : 0
(IR) : off	TRAIN TILT
SECT : 2 TILT : 0	CCW : 0 CW : 0 ↑ : 0
F/H:0 EVENT:0 R/B:0	SECTOR : 0 ↓ : 0
TRACK X : 0	1 : 0 2 : 0 3 : 0
BALL Y : 0	----------
	LEV:128 TIM:117 NL:0
1 : 0 2 : 0 3 : 0	HUE : 0 E/S : 0 * : 0
ENTER : 0	FAST:0 TK:0 V:H:0 AT:0
	↑ : 0 MENU : END
ROLL : 0.0	
PITCH : 0.0	↓ : 0 ← : 0 → : 0

3. Read ROLL/PITCH angles on the screen.

4. By using the clinometer on the ship or by other means, measure ship's semi-permanent inclination angle. Take the polarity of the angle as follows:

ROLL	starboard up: +,	starboard down: −
PITCH	stern up: +,	stern down: −



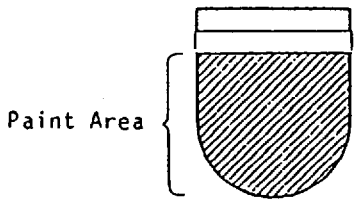
5. Adjust the ROLL/PITCH potentiometers R9 and R12 on the MTR board 06P0201 in the display unit so angle readout on the screen agrees with the angles measured at step 4

3.4 Soundome Painting

When the soundome is painted to prevent oysters and shells to grow on its surface, observe the following precautions.

1. Use anti-fouling paint type MARINE STAR 20 manufactured in Japan by Chugoku Marine Co., Ltd. Other type should not be used.

2. Paint only the plastic portion of the dome.
   Painting the metal portion causes electrolytic corrosion.



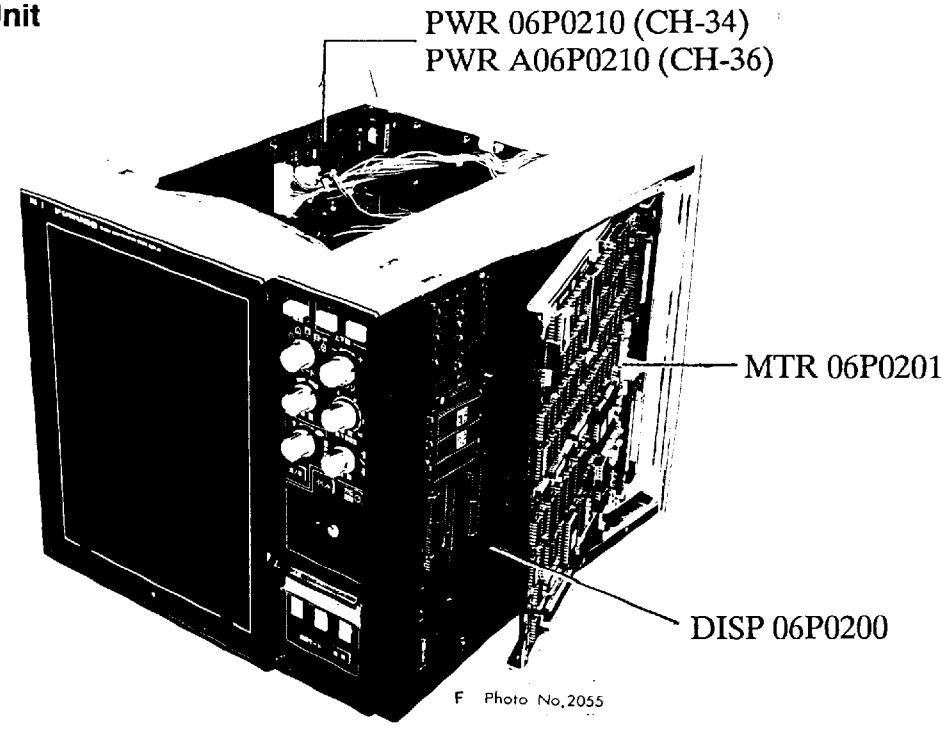
3.5 LED Status Check

Check the LED status on the pc boards.

Display unit setting

Range: 400m Mode: TX Output Power: C (Max.)
Tilt: 0° TX Rate: 10

3.5.1 Display Unit

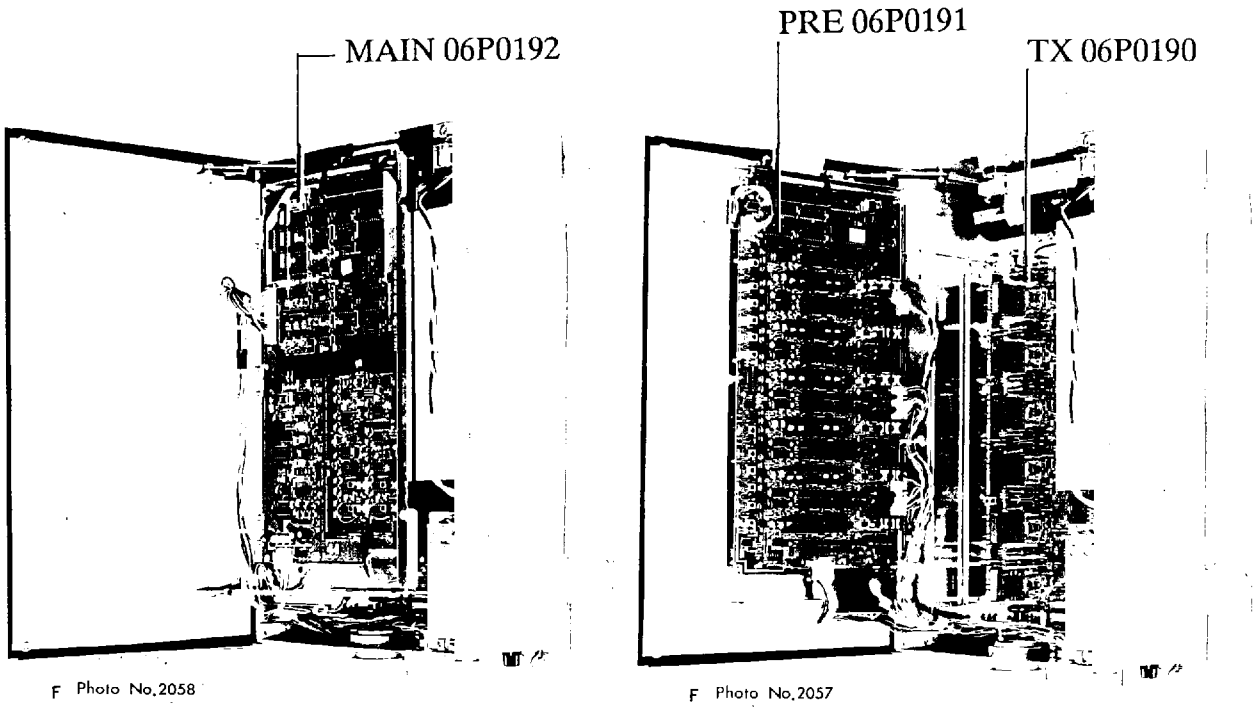


Off: ● Flicker: ◑ Light: ○

PCB	LED			Remarks
	No.	Signal	Status	
DISP 06P0200	CR1	R/L CONT	●	Off except when the transducer is being lowered.
	CR2	HALT	●	Lights when CPU stops.
	CR3	BERR	●	Bus error
	CR4	+12V AUDIO	○	+12V power supply for audio amp
	CR27	KP	◑	Flickers during transmission
	CR32	+5V	○	
	CR33	+12V	○	
	CR34	-12V	○	
	CR10	+12V	○	
	CR11	+5V	○	
	CR12	TIM	●	

	CR13	TI CLK	●	Lights while TILT lever is pressed and goes off while released.
	CR14	TR CLK	◑	Flickers while transducer training is in operation and goes off while transducer is stopped.
	CR15	L CONT	●	Off except when the transducer is being lowered.
	CR25	TI 190°	●	Lights momentarily when transducer tilt angle is 90° or 190°.
	CR26	TI +10°	●	Lights momentarily when transducer tilt angle is +10° or 90°.
	CR27	TR 180°	◑	Lights momentarily when transducer is trained to 180° direction.
	CR28	TR 0°	◑	Lights momentarily when transducer is trained to 0° direction.
	CR32	HULL	○	Lights while ship's mains is supplied to hull unit.
	CR33	KP	◑	Flickers during transmission
	CR35	EXT	●	Lights whenever KP for synchronous transmission is fed from external equipment. (Connection to external equipment is necessary.)
	CR36	D0	◑	Flickers by received echoes.
	CR37	D1	◑	
	CR38	D2	◑	
	CR39	D3	◑	
PWR Board 06P0210 (CH-34) A06P0210 (CH-36)	CR8	TV	○	Power supply for color monitor (CH-34: +90V, CH-36: +110V)
	CR11	+12V	○	
	CR12	-12V	○	
	CR13	+5V	○	
	CR26	F12V	○	
	CR38	IN 5V	●	Lights momentarily when overvoltage protector for 5V operates.
	CR39	IN 12V	●	Lights momentarily when overvoltage protector for 12V line operates.

3.5.2 Transceiver Unit

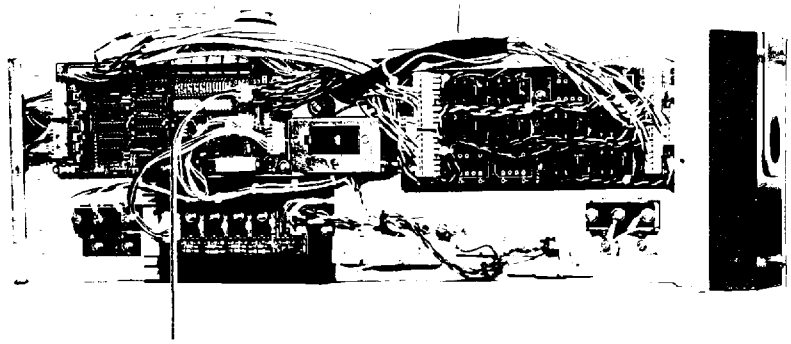


Off:: ● Flicker: ◑ Light: ○

PCB	LED			Remarks
	No.	Signal	Status	
TX Board 06P0190	CR11	+5V	○	
	CR12	+12V	○	
	CR13	+130V	○	
	CR39	TX1	◑	Flickers during transmission
	CR40	$\overline{\text{TX12}}$	◑	Ditto
	CR41	TX11	◑	Ditto
	CR42	$\overline{\text{TX2}}$	◑	Ditto
	CR43	TX3	◑	Ditto
	CR44	$\overline{\text{TX10}}$	◑	Ditto
	CR45	TX9	◑	Ditto
	CR46	$\overline{\text{TX4}}$	◑	Ditto
	CR47	TX5	◑	Ditto
	CR48	$\overline{\text{TX8}}$	◑	Ditto
	CR49	TX7	◑	Ditto
	CR50	$\overline{\text{TX6}}$	◑	Ditto
PRE Board 06P0191	CR1	+5V	○	
	CR2	+12V	○	
	CR3	-12V	○	

MAIN Board 06P0192	CR1	+5V	○	
	CR2	-12V	○	
	CR3	+12V	○	
	CR4	AUD	◑	Flickers by audio signal.
	CR16	FS	○	FS signal
	CR17	TVG	◑	Digital TVG signal
	CR18	LCLK	○	TVG signal latch clock
PWR Board 06P0172	CR9	-12V	○	
	CR10	+12V	○	
	CR11	+5V	○	
	CR12	+130V	○	

3.5.3 Hull Unit



DRIVE 06P0193

Off: ● Flicker: ◑ Light: ○

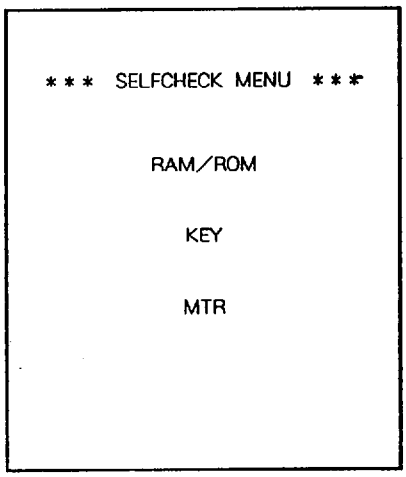
PCB	LED			Remarks
	No.	Signal	Status	
DRIVE Board 06P0193	CR12	TR0°	◑	Lights momentarily when transducer is trained in 0° direction.
	CR13	TR180°	◑	Lights momentarily when transducer is trained in 180 direction.
	CR14	TI+10°	●	Lights when transducer is tilted to +10° or 90°.
	CR15	TI90°	●	Lights when transducer is tilted to 90°.
	CR16	+13V	○	
	CR18	TR CLK	○	Lights while transducer training is in operation.
	CR19	TI CLK	●	Lights while TILT lever is pressed and goes off when released.
	CR20	+13V	○	

3.6 Selfcheck

The CH-34/36 has four built-in diagnostic selfchecks which check it for proper operation. Execute the checks after all the installation jobs are completed.

3.6.1 Turning on/off Selfcheck

1. Turn on the CH-34/36 while pressing the **EVENT** key and keep press the **EVENT** key until a beep is heard, and the selfcheck menu as shown below is displayed.



2. Select an appropriate selfcheck by operating [↑][↓] keys on sub-panel 2.
3. Press the **MENU** key to execute the selected selfcheck.
4. To return to the selfcheck menu, press the **MENU** key again.
5. To exit from the selfcheck screen, turn off and then on the CH-34/36.

3.6.2 Description of Selfchecks

RAM/ROM Check

This checks the major circuits in the display unit for proper operation.

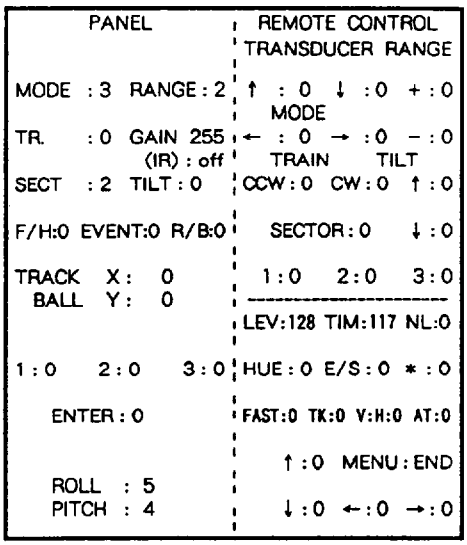
```
          DISP UNIT
PROGRAM NO.    065-0055-100
               065-0055-200
DATA ROM VER.  065-0056-100
BACKUP VER.    1
ROM            OK
RAM            OK
DATA ROM       OK
BACKUP RAM     OK

          MTR UNIT
PROGRAM NO.    061-0057-100
ROM            OK
RAM            OK

          I/F UNIT
PROGRAM NO.    105-267-002
ROM            OK
RAM            OK
```

Program numbers of DISP, MTR and I/F boards are displayed, and RAM/ROM are checked for proper operation.

If the interface board (option) is not incorporated, the check results enclosed by dotted lines are not displayed.

KEY Check

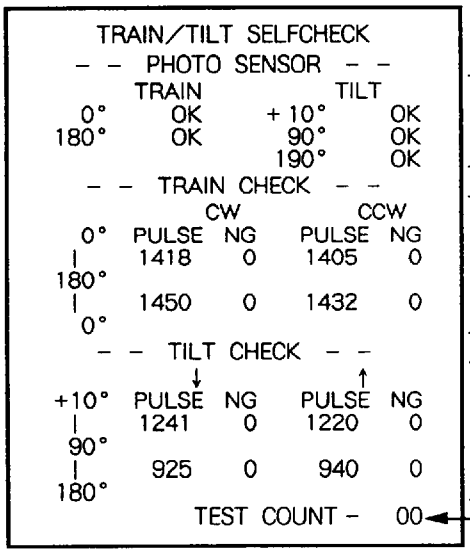
This checks the operating switches on the main panel for proper operation.



If the value changes when each switch is operated, the switch is normal.

MTR Check

This checks the transducer training and tilting functions for proper operation.



This checks the photo sensors which detect the reference angles for training/tilting operations.

This checks the transducer training operation. The four digit figures show the number of pulses used to train the transducer by 180°. If they are abnormal, NG (No Good) count increases by one.

This checks the transducer tilting operation. If the number of pulses used to tilt the transducer is abnormal, NG count increases by one.

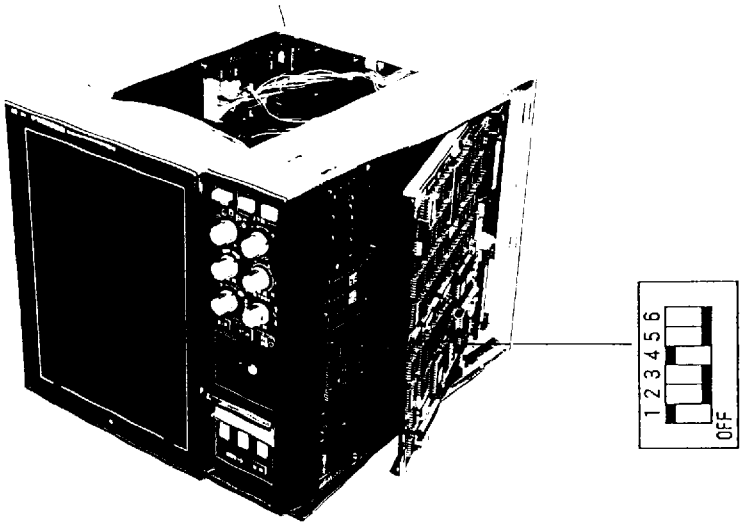
Above checks are repeatedly executed. This count increases by one upon completion of one cycle of checks.

CHAPTER 4.
CHANGING SPECIFICATIONS

According to user requirements, and in order to render use even easier, the operating specifications can be changed to those shown in the following tables.

4.1 Changing DIP Switch Setting

The switches used to change the specifications are located on the DISP board in the display unit. Change settings to fit user's particular requirements.



Function	No.	Description			
Input Signal	1	ON	Echo Signal	OFF	Test Signal
	2	OFF		ON	
Echo Dynamic Range	3	On: Wide Off: Narrow Choose "wide" for better sensitivity of weak echoes.			
Echo Smoothing	4	On: Smoothing on Off: Smoothing off Echo smoothing stretches echoes in distance direction.			

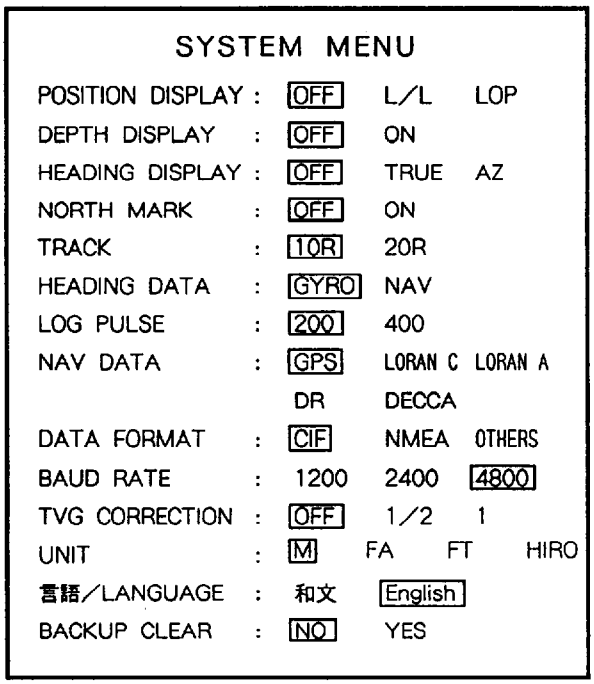
4.2System Menu Setting

4.2.1 Operating Procedure

1. Turn on the power while pressing **MENU** key.

2. Select item with [↑][↓] keys and set parameter with [←][→] keys.

3. To return to the normal display, turn off/on the unit.



4.2.2 Explanation of System Menu Items

Item	Parameter	Description
Position Display	Off L/L LOP	Selection of ship's position display L/L ------- Latitude/Longitude LOP ----- Line Of Position of loran system
Depth Display	OFF ON	On/off of depth data fed from color video sounder
Heading Display	OFF TRUE AZ	Selection of heading display True: True bearing AZ: 16 azimuth bearing
North Mark	OFF ON	On/off of north mark
Track	10R 20R	Selection of length of ship's courseline plotting 10R: Ten times the range in use 20R: Twenty times the range in use

HDG/SPD Data	GYRO.LOG CI NAV	Selection of data used for ship's courseline plotting Gyro.Log: Data from gyrocompass and speed log CI: Data from current indicator NAV: Data from navigation equipment	
Log Pulse	200 400	Setting pulses-per-mile (pps) specifications of speed log 200 ---- 200pps 400 ---- 400pps	
Nav Data	GPS LORAN C LORAN A DR DECCA OTHERS	Selection of source of ship's position data NOTE: For sat-nav combined with Loran-A or C in FURUNO CIF data format, select Loran-A or Loran-C.	
Data Format	CIF NMEA	Selection of input data format	
Nav Baud Rate	1200 2400 4800	Selection of baud rate of the data input from the navigation equipment	
CI Baud Rate	1200 2400 4800	Selection of baud rate of the data from the current indicator	
V-Mode Manu Train	HALF FULL	Selection of manual training sector width of the vertical fan mode Half: Half circle Full: Full circle	
TVG Correction	Off 1/2 1	Changing TVG curve to compensate for absorption attenuation of ultrasonic wave in water	
		OFF:	Absorption attenuation neglected
		1/2:	1/2 of theoretical absorption attenuation value added to TVG curve
		1:	Full theoretical absorption attenuation value added to TVG curve
Unit	M FT FA HIRO	Unit selection	
Language	ENGLISH	Select English. The other is Japanese.	
Backup Clear	No Yes	Select "Yes" to reset the system menu to the default settings.	

APPENDIX 1. INSTALLATION OF INTERFACE MODULE CH-344

The interface module CH-344 is required to connect the CH-34/36 navigation equipment, echo sounder, etc. and it is usually installed in the display unit at the factory. When it is separately supplied, install it as follows.

1) Remove the display unit cover.

2) Remove the blind plate on the rear of the display unit.

3) Remove three fixing screws for the MTR board (06P0201).

4) Install the interface board and plug in the flat cable to J11 on the DISP board (06P0200).

5) Connect the cables of the connector plate assembly to the DISP and interface boards.

CN-6 (Nav) ---------- J3
CN-7 (Current Indicator) ----------J4
CN-8 (Echo Sounder, Sonde) -------J8 (DISP Board)
CN-9 (Gyrocompass) ---------- J6
CN-10 (Speed Log) ---------- J6

6) Plug the XH connector assembly supplied to J5 on interface board and J7 on DISP board.

7) Fix the connector assembly on the rear plate.